Soil-Structure Interaction Analyses and Results for the US-APWR Standard Plant

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Revision History

Revision	Page	Description
0	All	Original Issue
1	2, 4 thru 15,17, 18, 19, 21, 26, 28, 33, 34, 36, 37, 41, 49, 50, 59 A-15, C-1 thru C-36, D-1 thru D-33, E-1 thru E-74, F-8, F-9, F-10, F-11, H-10, H-11	Section 3.6.2 was changed to provide clarification of how PS/B loads were developed Section 3.7 was changed to provide revised lateral pressure loads for underground exterior walls Raised the R/B maximum frequency of SSI analysis to 50 Hz for soil cases 900-100 and 900-200 Revised ISRS for PCCV, CIS, R/B + FH/A and SDOF Updated seismic design shear and axial forces for IC18, IC08, IC05, IC15, IC04, IC14, IC03, IC02 and IC01. Updated PS/B Gas Turbine Generator ISRS in vertical direction. Updated soil profile 270-500 (Table 3-3A) and 560-100 (Table 3-3E) Updated Dynamic Lateral Earth Pressure (Table 4-12) Corrected shear and axial force values in Table 4-14 Figure 3-8 is added to provide distribution of total lateral pressure loads for design of underground exterior walls Corrected Titles for Appendix H, Figures 10 & 11

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Abstract

The purpose of this technical report is to present the soil-structure interaction (SSI) analyses of the US-APWR prestressed concrete containment vessel (PCCV), containment internal structure (CIS), reactor building (R/B), and the power source buildings (PS/Bs) as referenced by US-APWR Design Control Document (DCD), Chapter 3 (Reference 1).

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List of Acronyms

The following list defines the acronyms used in this document.

3-D	**three dimensional**
A/B	**auxiliary building**
ARS	**acceleration response spectra**
CEUS	**Central and Eastern United States**
CIS	**containment internal structure**
CSDRS	**certified seismic design response spectra**
DCD	**Design Control Document**
EW	**east-west**
FE	**finite element**
FFT	**Fast Fourier Transformation**
FH/A	**fuel handling area**
GTG	**gas turbine generators**
ISRS	**in-structure response spectra**
NS	**north-south**
PCCV	**prestressed concrete containment vessel**
PS/B	**power source building**
R/B	**reactor building**
RCL	**reactor coolant loop**
RCP	**reactor coolant pump**
RV	**reactor vessel**
RWSP	**refueling water storage pit**
SDOF	**single degree of freedom**
SG	**steam generator**
SRSS	**square root sum of the squares**
SSC	**system, subsystem and component**
SSE	**safe shutdown earthquake**
SSI	**soil-structure interaction**
T/B	**turbine building**

1.0 INTRODUCTION

This report documents the soil-structure interaction (SSI) analyses of the prestressed concrete containment vessel (PCCV), containment internal structure (CIS), reactor building (R/B) including the fuel handling area (FH/A), referred to as the R/B complex in the following text; and the east and west power source buildings (PS/Bs) of the US-APWR standard plant.

As stated in US-APWR Design Control Document (DCD) Subsection 3.7.2.4 (Reference 1), SSI effects are considered in the seismic response analysis of all major seismic category I and seismic category II buildings and structures that are part of the US-APWR standard and non-standard plant. The ACS SASSI computer program (Reference 2) is the SASSI computer program that has been used for the SSI analyses described in this report. The SSI analyses are conducted using methods and approaches consistent with ASCE 4-98 (Reference 3).

2.0 DESCRIPTION OF US-APWR STANDARD PLANT STRUCTURES

2.1 Reactor Building Complex

A common power block foundation basemat supports the R/B, as well as the PCCV and CIS. This complex of structures includes the following functional areas.

- PCCV and CIS, including the internals coupled with the reactor coolant loops (RCL)
- Safety system pumps and heat exchangers area
- Fuel handling area
- Main steam and feed water area
- Safety-related electrical area

The common foundation of the R/B Complex, located at a depth of 38'-10" from plant grade, is 213'-4" x 308'-11" in plan dimensions and varies in thickness from 9'-11" at the edges to 39'-10" at the center where the containment structure is located. Table 3-1 provides a summary of the R/B complex main dimensions. Expansion joints separate the R/B complex basement from the foundations of the surrounding buildings, turbine building (T/B), auxiliary building (A/B), east and west PS/Bs. The gap distance of the expansion joints is dimensioned to prevent contact between the building as result of the seismic structural displacements and/or differential settlement of the buildings foundations. The north and partially the west exterior walls of the R/B complex basement are in contact with embedment soil.

Although the R/B, CIS and PCCV structures are supported on the common basemat, they are independent free standing structures above the basemat. The R/B is a five-story reinforced concrete structure extending 180'-10" above the basemat. The R/B structure consists primarily of shear walls and reinforced concrete floor diaphragms. It envelops a free-standing containment at its center.

The PCCV is a vertically oriented cylindrical structure with an inside diameter of 149'-2". It extends from the basemat to an inside height of 226'-5" where a 3'-8" thick hemispherical dome comprises the roof structure. The vertical cylindrical walls are 4'-4" thick and accommodate the equipment hatch and personnel airlocks. The PCCV is circumferentially and vertically post-tensioned with unbonded tendons. The CIS include the refueling water storage pit (RWSP), reactor cavity, refueling cavity, refueling canal, operating deck, and major piping, mechanical, and electrical penetrations.

The US-APWR is a four loop plant with four safety trains. Each RCL consists of the reactor vessel (RV), the steam generator (SG), the reactor coolant pump (RCP), and the loop piping. The loop piping consists of hot leg, crossover leg and cold leg piping in which the coolant flows from RV to SG, from SG to RCP, and from RCP back to RV, respectively.

2.2 Power Source Buildings

The plan dimension of each PS/B is 114'-10" x 69'-4". Table 3-2 provides a summary of the PS/B main dimensions. Each PS/B is a reinforced concrete structure consisting of vertical

shear/bearing walls and horizontal slabs with one floor level under ground and the main floor level above ground. The walls carry the vertical loads from the structure to the basemat. Lateral loads are transferred to the walls by the roof and floor slabs.

The west PS/B borders the R/B, A/B, and T/B, the east PS/B borders the R/B and the T/B. Each PS/B rests on its own basemat. Each PS/B is designed with an expansion joint along its interface with the R/B to assure that no contact will occur between the buildings under a seismic or any other design basis loading including differential settlement of the foundation. The expansion joint is sized to prevent contact between the structures even if the maximum translational and rotational displacements due to a seismic loading (and other design basis loading) were to occur.

3.0 US-APWR SEISMIC DESIGN BASES

3.1 SSI Analysis Methodology

The ACS SASSI computer program (Reference 2) has been used as the computer program for the SSI analyses of US-APWR R/B complex and PS/B. The program employs the complex response method and finite element (FE) technique to solve for the seismic response of the SSI system in frequency domain. The response is calculated at selected frequency of analysis and then interpolated for the range of frequency of interest. The plots of transfer functions amplitudes for the response at major floor mass nodes serve as check of the adequacy of the selected frequencies of analyses and the accuracy of the transfer function interpolation. The Fast Fourier Transformation (FFT) and inverse FFT technique is used to transform the input motion and the nodal responses of the system between frequency and time domain. The number of FFT points is set to 16384 for the R/B complex model and 8192 for the PS/B model.

The maximum frequency of analysis is determined from the rule in Reference 2 that the size of the soil layers or the FE elements in contact with soil should not be bigger than 20% of the wave length of the soil material. When the inertial property of the soil material is modeled using one-half the lumped-mass model and one-half the consistent-mass model, the maximum transmitting frequency of the subgrade f_{L_max} and the basemat FE mesh f_{B_max} are calculated as follows:

$$f_{L_max} = \min\left(\frac{Vs_i}{5 \cdot d_i}\right)_{\langle i=1 \rightarrow N_L \rangle} \qquad f_{B_max} = \frac{Vs_1}{5 \cdot d_{FE}} \qquad \text{(Equations 1a and 1b)}$$

where Vs_i and d_i are the shear wave velocity and the thickness of the soil layer i = 1 for the top soil layer to N_L, the total number of soil layers; and d_{FE} is the maximum size of the FE mesh of the structural model at the soil-structure interaction interface. The analysis results are checked to ensure that the used cut-off frequency of analysis captures the critical seismic response.

The SASSI analysis employs the numerical Green's function method to obtain the SSI impedance. All the nodes at the contact of the building basement with the subgrade serve as interaction nodes. The design earthquake is input at the foundations bottom nominal elevation of -36'-3". S-waves propagating upward represent the two horizontal components of the design earthquake motion H1 and H2 that are applied in north-south (NS), east-west (EW) direction, respectively. The vertical component of the design earthquake motion V is represented by vertically propagating P-waves. The three components of the earthquake are applied to the models separately.

3.2 Site Conditions

Technical Report MUAP-10001 (Reference 4) provides input soil/rock properties for the SSI analyses that are compatible with the strains generated by the input ground motion and envelope the effects of geological, geotechnical, and hydrological site parameters for representative nuclear power plant sites within the continental US. A set of the eight (8) generic layered profiles developed in MUAP-10001 are used for the SSI analyses, which median strain-compatible properties, shear-wave (Vs) and compressional-wave (Vp) velocities and corresponding hysteretic damping values provide a wide variation of properties that

addresses soil properties for typical sites across Central and Eastern United States (CEUS).

The SSI analyses performed for the set of eight generic layered soil profiles consider the effects of frequency dependence of SSI for layered sites. The generic site profiles consider a nominal elevation of groundwater table located 1 ft below the plant grade. The subgrade supporting the foundations is considered saturated in these analyses. The basements of the R/B complex and PS/Bs are separated from the buildings around them by expansion joints to prevent their collision during an earthquake. Portions of the R/B complex and PS/Bs basements are in direct contact with the embedment soil. The SSI analyses performed for the generic sites consider the common basemat of the R/B complex and the basemats of the PS/B resting on the surface of the subgrade located approximately 40 feet below the plant nominal ground surface elevation. The eight generic subgrade profiles used for the site-independent analyses of surface mounted foundations are obtained by removing the top 40 ft of soil from the generic profiles with median strain-compatible properties developed in Technical Report MUAP-10001 (Reference 4). The subgrade profiles used for the SSI analyses use values for the soil material damping equal to median strain compatible values obtained from the equivalent-linear site response analyses of vertically propagating shear waves. The embedment effects are addressed on site-specific basis as mandated by Subsection 3.7.2.4 of the US-APWR DCD (Reference 1).

The site subgrade models in the ACS SASSI (Reference 2) analyses use infinite horizontal layers to represent the top of at least 600 feet and 250 feet of subgrade materials for the R/B complex and PS/B, respectively. An elastic half-space that is modeled by an additional 10 elasto-plastic layers represents the dynamic properties of the subgrade located at least 600 feet and 250 feet below the foundation elevation for the R/B and PS/B, respectively. Tables 3-3A through 3-3H present the input material properties of the subgrade. The layering of the subgrade is adjusted to ensure that the thickness of the soil layers is not more than 20% of the minimum wave length corresponding to the selected cut-off frequency of analysis. Table 3-4 provides the maximum transmitting frequencies of the subgrade and the basement FE mesh and corresponding cut-off frequency of analysis for the eight generic subgrade profiles considered in the site-independent SSI analyses.

3.3 Input Ground Motion

Technical Report MUAP-10001 (Reference 4) provides a set of three statistically independent acceleration time histories, H1, H2, and V representing the input ground motion in NS, EW, and vertical direction, respectively. The acceleration time histories are compatible to the US-APWR certified seismic design response spectra (CSDRS) and in compliance with the requirements of NUREG-0800 Standard Review Plan (SRP) 3.7.1 (Reference 5), Subsection 3.7.1.II.1B, Option 1 Approach 2.

Figure 3-1 presents the 5% damping horizontal and vertical CSDRS. Figure 3-2 presents the three acceleration time histories used as input ground motion for site independent SSI analyses. The time step and duration of the acceleration time histories is 0.005 second and 22.005 seconds, respectively. The corresponding frequency step is 0.0122 Hz for the R/B complex analysis and 0.0244 Hz for the PS/B analysis.

3.4 Structural Models

Technical Report MUAP-10001 (Reference 4) describes the development and validation of the ACS SASSI models of the R/B complex and PS/B. The validation analyses presented in the report, ensure the accuracy of the ACS SASSI models of the R/B complex and PS/B and demonstrate that the modeling requirements of SRP 3.7.2 (Reference 6), Section II 1.A(iv) are met.

3.4.1 R/B Complex Structural Model

The ACS SASSI structural model of R/B complex consists of the FE model representing the dynamic properties of the basement shear walls and basemat, and the lumped-mass stick models representing the dynamic properties of the major equipment and building structures above grade. Figure 3-3 shows the ACS SASSI model used for SSI analyses of the R/B complex. Lumped mass stick models represent the stiffness and mass inertia properties of the R/B including FH/A, PCCV, and CIS coupled with the RCL. Lumped mass stick models of the RV and the four SG and RCP are included in the RCL model as described in MUAP-10001.

In MUAP-10001, the capability of the lumped-mass stick models to capture local high frequency responses have been enhanced by incorporating single degree of freedom (SDOF) models to capture the out-of-plane response of flexible floors and slabs. The stiffness of the structural members subjected to high stresses under the most critical seismic load combination has been adjusted to take in account effects of concrete cracking. The site-independent SSI analyses use two structural models of the R/B complex with different mesh of the basement FE model. The geometry, stiffness and mass inertia properties of the basement FE models are identical. The only difference between the models is in the nominal size of the basement mesh that is set to 10 ft and 14 ft in order to ensure that the size of the basemat FE mesh meets the maximum transmitting frequency requirements for different subgrade stiffness conditions and minimize the required computer run time. Table 3-4 presents the maximum transmitting frequencies of analyses for different structural models and subgrade stiffnesses considered by the SSI analyses.

Table 3-1 presents the main dimensions and elevations defining the R/B complex geometry. Table 3-5 provides the weight of the main building structures and components. The safe shutdown earthquake (SSE) values of material damping presented in Table 3-7 are assigned to the R/B complex model. Table 3-8 provides the fixed base natural frequencies of the PCCV, CIS and R/B lumped mass stick models. Table 3-4 presents the cut-off frequencies of analyses of the R/B Complex basement FE model for different generic site profiles considered. Appendix A of this Report provides the numbering of the nodes of the two models used for site specific SSI analyses of R/B complex. Detailed description of the structural model and information about its properties are provided in MUAP-10001.

3.4.2 PS/B Structural Model

The SSI analyses of the east and west PS/B use a three dimensional (3-D) FE model shown in Figure 3-6 to represent the dynamic properties of the PS/B structure. The model reflects the geometry and dynamic properties of the west PS/B but is also used for the SSI analyses of the east PS/B since the buildings are nearly identical.

The PS/B models use shell elements to represent the stiffness and inertia properties of structural walls and slabs, including the floor slabs and roof slabs. The properties of the shell elements are adjusted to consider the effect of the concrete cracking on the out-of-plane stiffness of the slab elements. The mass density properties of the slab shell elements are adjusted to include the mass of the equipment, the mass associated with additional dead and live loads. The mass of the equipment is distributed over a representative floor area or equipment support footprint area. Beam elements model the structural beams and columns of the PS/B. Solid brick elements with eight (8) nodes represent the basemat of the building. At the connections between the basemat and the walls, the shell elements extend into the basemat solid elements to transmit nodal rotations. The extended elements share nodes with the corresponding face of the solid elements but have no mass.

The major dimensions that define the geometry of the FE model are listed in Table 3-2. Table 3-6 presents the weights of the PS/B, and Table 3-7 presents the material properties of the PS/B reinforced concrete structural members. Table 3-8 provides a summary of the building fixed base modal properties in terms of natural frequencies of the first five major modes of vibration. Table 3-4 presents the maximum transmitting frequencies and corresponding cut-off frequencies of analyses of the PS/B FE model for the different generic site profiles considered. Appendix A provides a list of representative node locations of the PS/B FE model. Detailed description of the structural model and its dynamic properties are provided in MUAP-10001.

3.5 Computation of In-Structure Response Spectra (ISRS)

In-structure response spectra (ISRS) are generated for various areas of the R/B complex and PS/B in accordance with US NRC RG 1.122 (Reference 7) to serve as the seismic design basis for design of category I and II systems, subsystems and components (SSCs). The SASSI analyses provide results for the response of the PCCV, CIS, R/B and PS/B structures due to the three components of the design earthquake for each of the eight site profiles. At representative node locations, 5% damping acceleration response spectra (ARS) in the three orthogonal directions are calculated for each of the three directions of the input ground motion. The ARS are calculated at 301 frequency points equally distributed on the logarithmic scale at the range of frequency from 0.1 Hz to 100 Hz. The responses obtained for the three directions of the input ground motion are combined using the square root sum of the squares (SRSS) method as follows:

$$ARS_x = \sqrt{ARS_{xx}^2 + ARS_{yx}^2 + ARS_{zx}^2}$$

$$ARS_y = \sqrt{ARS_{xy}^2 + ARS_{yy}^2 + ARS_{zy}^2} \qquad \text{(Equation 2a, 2b, and 2c)}$$

$$ARS_z = \sqrt{ARS_{xz}^2 + ARS_{yz}^2 + ARS_{zz}^2}$$

where:

- $ARS_{(m)(n)}$ are the SASSI ARS results for the response in “n” direction due to earthquake in “m” direction,

- ARS_X, ARS_Y and ARS_Z are the combined ARS of the structural response in NS (x), EW (y), and vertical (z) direction.

The results for SRSS-combined ARS at each representative node location obtained from the results of the ACS SASSI analyses of each of the eight generic site conditions presented in Section 3.2 (270-500, 270-200, 560-100, 560-200, 560-500, 900-200, 900-100, 2032-100) are then enveloped. The enveloped ARS are then combined as described below to obtain the combined ARS for the response at different locations within the R/B complex and PS/B. The ISRS are developed by broadening the combined ARS by 15% to account for uncertainties in the analysis parameters. Figure 3-4 and 3-5 demonstrate how the eight soil conditions are enveloped and broadened for a sample nodal mass point.

Table 3-9 and Table 3-10, respectively, provide a list of the ISRS of the response of the PCCV and CIS. The ISRS representing the responses of the PCCV in all three directions are obtained directly by broadening the ARS of the responses at the lump mass nodes. The ISRS for CIS response are obtained by enveloping the ARS calculated at lumped mass nodes with the ARS at locations as shown in the last column of Table 3-10. One set of three ISRS represent the response of the steam generators at two elevations (ICS1OR and ICS2OR), and the pressurizer at three elevations (ICP1OR, ICP2OR, and ICP3OR) in three orthogonal directions.

Table 3-11 and Table 3-12 list the ISRS representing the response of the R/B. The ISRS provided in Table 3-11 represent the horizontal and vertical out-of-plane response of the rigid slabs and walls. These are obtained by enveloping the ARS calculated at the floor lumped mass location and the ARS at outrigger locations as shown in the last column of Table 3-11. The ISRS representing the out-of-plane response of R/B flexible slabs, roofs and walls are provided in Table 3-12. These ISRS represent the response at the specified location in only one direction, vertical for the flexible slabs and horizontal for the walls. They are generated from the ARS results for the response of the SDOF elements. The SDOF ARS results are grouped together as described in the last column of Table 3-12 based on the location and the characteristics of the SDOF response. The grouped SDOF ARS are then enveloped to generate the ISRS that represent the response of the R/B structure at a particular zone. Table 3-12 and the figures in Appendix B of this Report describe the location of the flexible floor and slab zones and the SDOF elements that contribute to each zone.

The ISRS for design of category I and II SSCs are developed from the ARS response at selected representative node locations of the PS/B FE model. For each major floor of the PS/B (basement, ground floor slab, and roof) two horizontal ISRS are developed in NS and EW direction. These ISRS envelop the ARS response at several representative locations within each floor elevation, including the corners of the building. The two vertical ISRS for the basemat and the roof are developed in a similar manner. Four vertical ISRS serve for the design of the three seismic Category I gas turbine generators (GTG) and the GTG panels. Each of the vertical GTG ISRS is developed as an envelope of the vertical response at four representative FE nodes within the GTG footprint area. In the case of the GTG panels, the vertical response of four FE nodes representative of the three panels are enveloped to develop the panels vertical ISRS. Table 3-13 list the ISRS representing the response of the PS/B. The nodes that are used for development of ISRS are listed in the last column of the table. Appendix A provides the coordinates of these nodes.

3.6 Computation of Seismic Loads

3.6.1 R/B Complex Seismic Loads

The SSI analyses using the lumped-mass-stick models of the R/B complex provide the maximum member forces/moments in the stick elements. These results are used as basis for development of the SSE design loads for the standard seismic design of the R/B complex structures. The SSI results for maximum accelerations at basement lumped mass nodes (CV00, IC00, RE00 and BS01) are used to evaluate the seismic design loads for the portion of the building below ground elevation. The results for maximum accelerations at SDOF masses provide the local out-of-plane loads for design of the reinforcement of flexible slabs and walls.

The following is the procedure used for calculation of seismic loads for design of R/B complex in terms of equivalent static acceleration loads:

1. Develop shear forces, axial force, bending moments and torsional moment diagrams from the results of SSI analyses of each generic soil profile for maximum member forces and moments in the stick elements. Three sets of force and moment diagrams are developed for each structure representing the response due to each of the three directions of the earthquake.

2. Develop equivalent horizontal forces F_{Hi} in NS and EW direction from the shear force diagrams for each floor elevation as shown as F_{Hi} in Figure 3-7. The equivalent forces in NS and EW direction at top elevations are equal to the corresponding maximum member forces in the stick members at the lumped mass stick model top nodes. At the lower elevations, the floor forces in NS direction F_{NSi} and EW direction F_{EWi} are calculated as follows:

   $$F_{NSi} = TNS_i^T - TNS_{j+1}^B \quad F_{EWi} = TEW_i^T - TEW_{i+1}^B \qquad \text{(Equations 3a \& 3b)}$$

   where TNS^T_i and TEW^T_i are the ACS SASSI results for shear member force in NS and EW direction at top of stick element “i"; TNS^B_{i+1} and TEW^B_{i+1} are the results for shear member force in NS and EW direction at bottom of stick element “i+1”.

3. Develop equivalent vertical loads F_{Vi} from the axial force diagram for each floor elevation as shown in Figure 3-7. Using the same methodology as for the horizontal equivalent forces, the equivalent forces in vertical direction at top elevations are equal to the corresponding maximum axial member forces in the top stick members. At the lower elevations, the floor forces in vertical direction are calculated based on the axial force results at top of stick member “i" (PV^T_i) and bottom of stick member “i+1” (PV^B_{i+1}) as follows:

   $$F_{Vi} = PV_i^T - PV_{i+1}^B \qquad \text{(Equation 4)}$$

4. Develop equivalent floor rocking moment in NS and EW direction from the bending moments diagrams for each floor elevation shown as M^R_i in Figure 3-7 that represent the bending moments generated by the rocking response of the floors rotational mass moments and the eccentricity of the vertical load about the horizontal axes. The

bending moments due to rocking at floor elevation “i" are separated from the bending moment diagrams and the bending moment generated by the horizontal loads as follows:

$$M_{NSi} = MBNS_i^T - MBNS_{j+1}^B \qquad M_{EWi} = MBEW_i^T - MBEW_{i+1}^B \quad \text{(Equations 5a and 5b)}$$

where: M_{NSi} is the rocking moment of floor “i" in the NS direction (about EW axis of the model); M_{EWi} is the rocking moment of floor “i" in the EW direction (about NS axis of the model); $MBNS^T_i$ and $MBEW^T_i$ are the ACS SASSI results for bending moments in NS and EW direction at top of stick element “i"; $MBNS^B_{i+1}$ and $MBEW^B_{i+1}$ are the ACS SASSI results for bending in NS and EW direction at bottom of stick element “i+1”.

5. Develop equivalent floor torsional moment M_{Ti} from the torsional moments diagrams for each floor elevation as shown in Figure 3-7 that are generated by the response of the floors torsional mass moments as well as the eccentricity between the floor mass and shear center. The equivalent torsion at floor elevation “i" (MTi) is derived from the ACS SASSI member stress results for torsional moment about the element longitudinal axis as follows:

$$M_{Ti} = MET_i^T - MET_{i+1}^B \quad \text{(Equation 6)}$$

where MET^T_i and MET^B_{i+1} are the ASC SASSI results for torsion at top of stick member “i" and bottom of stick member “i+1”.

6. Use the SRSS method to combine the seismic floor forces and moments that are due to three components of the earthquake. For example, the SRSS of the equivalent force in EW direction for floor elevation “i” is calculated as follows:

$$F_{EWi}^{SRSS} = \sqrt{\left(F_{EWi}^{NS\text{-}eq}\right)^2 + \left(F_{EWi}^{EW\text{-}eq}\right)^2 + \left(F_{EWi}^{Vt\text{-}eq}\right)^2} \quad \text{(Equation 7)}$$

where $F_{EWi}^{NS\text{-}eq}$, $F_{EWi}^{EW\text{-}eq}$, and $F_{EWi}^{Vt\text{-}eq}$ are the equivalent floor “i” forces due to NS, EW, and vertical component of the earthquake, respectively.

7. Envelope the SRSS combined equivalent seismic floor forces and moments obtained from the SSI analyses of the eight generic soil profiles.

8. Adjust the magnitude of the vertical load F_V to include the effect of the floor rocking using the following equation:

$$F_V' = \sqrt{F_V^2 + \left(\frac{M_{NS}}{L_{NS}}\right)^2 + \left(\frac{M_{EW}}{L_{EW}}\right)^2} \quad \text{(Equation 8)}$$

where M_{NS} and M_{EW} are the floor rocking moments in NS and EW direction (moments about EW and NS axes, respectively) and the L_{NS} and L_{EW} are the NS and EW length of the floor.

9. Adjust the magnitude of the horizontal floor loads F_H to include the effect of the floor torsional response M_T using the following equation:

$$F'_{NS} = F_{NS} + \frac{M_T}{L_{EW}} \qquad F'_{EW} = F_{EW} + \frac{M_T}{L_{NS}}$$ (Equations 9a and 9b)

10. Select magnitudes of story loads based on enveloped values of F'_V and F'_{NS} F'_{EW} and divide them by the corresponding floor weights to convert the loads in terms of equivalent static accelerations floor loads.

11. Envelope the results obtained from the SSI analyses of eight generic soil profiles for maximum accelerations at SDOF masses to develop the magnitudes of the local out-of-plane loads on flexible slabs and walls. The out-of-plane loads are grouped as shown in Table 3-12 in the same slab/wall areas as the ISRS.

3.6.2 PS/B Seismic Loads

The results obtained from the site-independent SSI analyses for maximum nodal accelerations serve as basis for development of the seismic loads used for the standard design of PS/B structural members. These seismic design loads are developed in the form of equivalent static accelerations as follows:

1. Calculate maximum accelerations in each of the 3 response directions due to each of the 3 direction input motions from the site-independent SSI analyses of PS/B.

2. Envelope the maximum nodal accelerations results obtained from the site-independent SSI analyses of eight generic site conditions.

3. For each floor elevation, create nine (9) bubble plots of the enveloped maximum accelerations in three directions calculated in Step 2 that represent the enveloped response of the PS/B due to the three components of the earthquake.

4. Apply the square root sum of the squares (SRSS) rule to combine the enveloped nodal maximum accelerations due to the three directions of the earthquake calculated in Step 1. Envelope the results of the SRSS combined maximum acceleration responses from the SSI analyses of the eight generic soil cases.

5. For each floor elevation, create three (3) bubble plots of the enveloped and SRSS combined maximum accelerations calculated in Step 4 that represent the enveloped response of the PS/B in the three directions of the earthquake.

6. Calculate weighted average accelerations at floor elevation “f” as follows:

$$A_i^f = \frac{\sum a_i^k \cdot w_k}{W_f}$$ (Equation 10)

where W_f is the total weight of the floor "f", w_k is the weight participating to node "k", A_i^f is the weighted average acceleration of floor "f" in "i' direction, and a_i^k is the enveloped and SRSS combined maximum acceleration at node "k" in "i' direction as calculated in Step 4 above.

7. Determine equivalent seismic quasi-static load at each floor elevation based on the maximum acceleration bubble plots created in Steps 3 and 5 and the weighted average accelerations calculated in Step 6.

8. Determine the out-of-plane seismic demands on slabs and walls with large unsupported areas based on the maximum acceleration plots created in Steps 3 and 5.

9. Calculate story shear diagrams for the PS/B structure. The total shear at each floor elevation is obtained as the sum of the all nodal inertial forces at and above that elevation. The nodal inertial forces are the product of the nodal mass and the equivalent quasi-static acceleration acting on the node calculated in Step 7 above.

3.7 Earth Pressure Design Load

The standard seismic design of the US-APWR R/B complex and PS/Bs is based on the analyses performed on surface-founded structure models that do not account for the support provided by the embedment soil surrounding the basements of the buildings. The earth pressure loads obtained from hand calculations are used for the standard design of the exterior walls of the basements to ensure they can withstand the static and dynamic earth pressure demands generated by the surrounding soil for a wide range of candidate site conditions within the continental US. The magnitudes of the earth pressure design loads are developed following the requirements of SRP 3.8.4 by considering lateral earth pressure equal to the sum of the static earth pressure at rest, plus the dynamic earth pressure due to horizontal component of the earthquake that are determined using Wood's soil pressure distributions as presented in Figure 3.5-1 of ASCE 4-98, Section 3.5.3.2 (Reference 3). The effect of the vertical component of the earthquake on the lateral dynamic earth pressure is also considered by using a simple quasi-static approach as described below. The calculations of the lateral earth pressure assume that the water table is at plant grade elevation.

The static and dynamic earth pressure design load is calculated as described below:

1. Calculate the horizontal earthquake excitation induced lateral pressure, denoted as p_{sh}, by interpolating and applying ASCE 4-98 Figure 3.5-1 for following soil and seismic parameters:

   Poisson ratio ν=0.4

   Soil unit weight (saturated/total) γ= 130 pcf

   Wall height H= 38.83 ft

   Horizontal seismic coefficient αh=0.6

   It is noted that using soil saturated (total) unit weight of 130 pcf assumes that the pore water will move together with the soil during earthquake shaking, and the inertial force is proportional to the total vertical stress (weight) acting on the embedment soil.

Based on the results of SSI analyses and additional studies, a value of 0.6 is used for the horizontal and vertical seismic coefficients, that is twice the free field peak ground acceleration at the bottom of the foundations in order to account for dynamic response amplification in the embedment soil.

2. The quasi-static dynamic lateral earth pressure due to vertical component of the earthquake, at a depth of z from the ground surface, denoted as p_{sv}, is calculated as:

$$p_{sv} = \alpha_v K_0 \cdot \gamma \cdot z \qquad \text{(Equation 11)}$$

where: γ is total unit weight of soil (130 pcf), k_0 = 0.5 is the coefficient at-rest of the soil and α_v=0.6 is the vertical seismic coefficient. This quasi-static pressure represents the additional horizontal earth pressure at rest produced by an increase in vertical effective stress induced by the vertical inertial forces at depth.

3. The static lateral earth pressures on the exterior walls consist of static at-rest earth pressure, and pressure due to surcharge. The total static lateral earth pressure at depth of z from the ground surface is calculated as:

$$p_{static} = K_0 \cdot \gamma_{eff} \cdot z + K_0 \cdot p_{surchage} \qquad \text{(Equation 12)}$$

where K_0 = 0.5 is the at-rest coefficient of the soil, γ_{eff} is effective unit weight of the soil (130-62.4 = 67.6 pcf) and $p_{surcharge}$ = 450 psf is a surcharge load on the ground surface. The first term in the above equation represents the static at-rest earth pressure calculated using effective stress on the wall, and the second term represents the contribution of the surcharge load.

4. The hydrostatic pressure on the wall at depth of z from the ground surface is calculated as:

$$p_{hydro} = \gamma_{water} \cdot z \qquad \text{(Equation 13)}$$

where γ_{water} = 62.4 pcf is the unit weight of water.

5. The static and seismic lateral earth pressures due to the vertical and horizontal component of the earthquake are added algebraically by conservatively assuming that the peak vertical and horizontal response accelerations in the embedment soil occur simultaneously. Therefore, the total static and dynamic lateral pressure on the exterior walls is calculated as follows:

$$P_s = p_{sh}+p_{sv}+p_{static}+p_{hydro} \qquad \text{(Equation 14)}$$

4.0 SSI ANALYSIS RESULTS

A set of site-independent SSI analyses are performed on the ACS SASSI models of R/B complex and PS/B resting on the surface of eight generic subgrade profiles. Table 3-4 provides a list of the SSI analyses and information regarding the number of frequencies of analyses and cut-off frequency. The results of the site-independent SSI analyses serve as basis for development of parameters for design of the structural members and the seismic category I systems, components and equipment of R/B complex and PS/B. The text below provides the developed seismic design parameters used for the standard seismic design of US-APWR R/B complex and PS/Bs. Appendix G summarizes the results for maximum accelerations, displacements and stick member forces obtained from the site-independent analyses of the R/B complex and PS/B for the different generic site conditions considered.

4.1 In-Structure Response Spectra (ISRS)

ISRS are generated for various areas of the R/B complex and PS/B following the methodology described in Section 3.5. The ISRS define the seismic demands for standard design of category I and II SSCs. Appendix C, Appendix D and Appendix E provide the 5% damping ISRS for the PCCV, CIS and R/B, respectively. Appendix B provides drawings showing the location within R/B and FH/A where the ISRS in Appendix E representing the response of flexible walls and slabs are applicable. Appendix F presents the 5% damping ISRS for the PS/B.

4.2 Maximum Displacements

Table 4-1, Table 4-2 and Table 4-3 provide the maximum displacements of the PCCV, CIS and R/B relative to the free field that are obtained as envelopes of the results obtained from the SSI analyses of the R/B complex resting on the surface of the eight generic soil profiles. The maximum displacements of PS/B relative to the free field motion are presented in Table 4-4.

The expansion joints size between the PCCV and the R/B is determined by considering, at all potential interaction locations, the absolute summation of the deflection associated with each super-structure, obtained from the results of the site-specific SSI analyses of those structures. The maximum displacement results obtained from the SSI analyses of the PCCV and R/B at operating floor elevation (lumped mass nodes CV04 and RE03, respectively), relative to the top of PCCV/CIS foundation (node IC00) are:

$$\sqrt{0.325^2 + 0.475^2} = 0.576 \cdot \text{in}$$ PCCV at node CV04

$$\sqrt{0.263^2 + 0.384^2} = 0.465 \cdot \text{in}$$ R/B at node RE03

This demonstrates that the 4 in gap between the two structures is sufficient to prevent interaction between them during design seismic event. Table 4-3 and Table 4-4 show that the maximum displacements of the R/B and PS/B relative to the free field motion at PS/B roof elevation are both less than 1 in, thus demonstrating that the 4 in gap between the building is sufficient to prevent the interaction between them in event of design earthquake.

4.3 SSE Loads

The SSE loads used for seismic design of R/B complex structural members are developed following the methodology described in Section 3.6. Table 4-5, Table 4-6 and Table 4-7 provide the SSE design loads that are used for design of PCCV, CIS and R/B structural members, respectively. Table 4-13, Table 4-14 and Table 4-15 present the shear and axial force diagrams resulting from the design seismic loads being applied on the lumped mass stick models of the PCCV, CIS and R/B, respectively. The out-of-plane SSE loads that in the standard design are applied on the flexible slabs and walls of the R/B and FH/A are shown in Tables 4-8 and 4-9.

Table 4-10 and 4-11 provide the seismic loads for standard design of PS/B structural members. The load magnitudes listed in Table 4-11 represent the loads acting in out-of-plane direction on the flexible slabs and walls. Bubble plots of PS/B seismic demand accelerations are found in Appendix H created as described in Step 5 of Section 3.5.2. Table 4-16 presents the shear force diagrams resulting from the design seismic loads being applied on the PS/B.

The SSE loads are provided in terms of quasi-static acceleration loads. The values of the SSE loads represent the envelope of the structural demands obtained from the SSI analyses of the R/B complex and PS/B of the eight generic soil profiles and are rounded up in order to include at least 5% additional design margin.

4.4 Lateral Pressure Loads

Table 4-12 presents the static and dynamic lateral pressure load used for the standard design of the exterior walls of R/B complex and PS/B basement. Figure 3-8 presents the distribution of the lateral pressures that are calculated following the methodology described in Section 3.7.

5.0 CONCLUSION

This report has presented the SSI analyses of the R/B complex and PS/Bs for a set of eight generic site conditions that envelope the conditions at wide variety of sites within continental USA. The SSI analyses consider a variety of SSI effects such as layering of the subgrade, the frequency dependence of SSI and elevation of the water table. The results of SSI analyses serve as basis for development of seismic design parameters used for the standard design of the US-APWR category I buildings. This report presents the seismic design loads used for the standard design of the structural members of the R/B complex and the east and west PS/Bs. The 5% damping ISRS are presented that define the seismic loads at different locations within the buildings for standard design of category I and II systems, subsystems and components.

6.0 REFERENCES

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2. ACS SASSI Version 2.3.0: An Advanced Computational Software for 3D Dynamic Analyses Including Soil Structure Interaction, Ghiocel Predictive Technologies, Inc., June 15, 2009.

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5. Seismic Design Parameters, NUREG-0800, SRP 3.7.1, Rev. 3, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

6. Seismic System Analysis, NUREG-0800, SRP 3.7.2, Rev. 3, U.S. Nuclear Regulatory Commission, Washington, DC, March 2007.

7. Development of Floor Design Response Spectra for Seismic Design of Floor-Supported Equipment or Components, Regulatory Guide 1.122, Rev. 1, U.S. Nuclear Regulatory Commission, Washington, DC, February 1978.

Table 3-1 Main Dimensions of the R/B Complex

Item	Value
Basemat Length in N-S Direction	308’-11”
Basemat Length in E-W Direction	213’-4”
PCCV Foundation Diameter	187’-0”
PCCV Foundation Thickness (1)	23’-9” / 39’-10”
R/B Basemat Thickness	9’-11”
Basement Exterior Wall Thickness (1)	3’-4” / 3’-8”
Nominal Basemat Bottom Elevation	-36’-3”
Nominal Ground Elevation	2’-7”
PCCV Dome Top Elevation	232’-0”
FH/A Roof Elevation	154’-6”

(1) Thickness varies

Table 3-2 Main Dimensions of PS/B

Item	Value
Basemat Length in N-S Direction	69’-4”
Basemat Length in E-W Direction	114’-10”
Basemat Thickness	9’-11”
Basement Exterior Wall Thickness	2’-8”
Nominal Basemat Bottom Elevation	-36’-3”
Nominal Ground Elevation	2’-7”
Main Roof Slab Top Elevation (not including roof appurtenances)	39’-6”

Table 3-3A Subgrade Properties 270-500 Generic Profile

Layer	Thickness	Depth	Unit Weight	Vs	Vp	Poisson Ratio	Damp.
#	[ft]	[ft]	kcf	ft/sec	ft/sec		%
1	4.29	0.0	0.125	1242	5498	0.473	3.34
2	4.29	4.3	0.125	1242	5498	0.473	3.34
3	4.29	8.6	0.125	1300	5730	0.473	3.39
4	4.29	12.9	0.125	1300	5730	0.473	3.39
5	4.29	17.2	0.125	1300	5730	0.473	3.39
6	4.29	21.5	0.125	1302	5779	0.473	3.55
7	4.29	25.7	0.125	1302	5779	0.473	3.55
8	4.29	30.0	0.125	1297	5785	0.474	3.75
9	4.29	34.3	0.125	1297	5785	0.474	3.75
10	4.29	38.6	0.125	1273	5744	0.474	3.96
11	4.69	42.9	0.125	1317	5904	0.474	2.92
12	4.69	47.6	0.125	1317	5904	0.474	2.92
13	4.69	52.3	0.125	1362	6102	0.474	2.93
14	4.69	57.0	0.125	1362	6102	0.474	2.93
15	4.69	61.7	0.125	1303	5898	0.474	3.15
16	4.69	66.4	0.125	1303	5898	0.474	3.15
17	4.69	71.0	0.125	1320	5987	0.474	3.18
18	4.69	75.7	0.125	1320	5987	0.474	3.18
19	4.69	80.4	0.125	1338	6081	0.475	3.21
20	4.69	85.1	0.125	1338	6081	0.475	3.21
21	4.69	89.8	0.125	1359	6179	0.475	3.23
22	4.69	94.5	0.125	1359	6179	0.475	3.23
23	5.00	99.2	0.131	1488	6666	0.474	2.94
24	5.00	104.2	0.131	1488	6666	0.474	2.94
25	5.00	109.2	0.131	1482	6663	0.474	3.00
26	5.00	114.2	0.131	1482	6663	0.474	3.00
27	5.00	119.2	0.131	1493	6725	0.474	3.03
28	5.00	124.2	0.131	1493	6725	0.474	3.03
29	5.00	129.2	0.131	1411	6424	0.475	3.27
30	5.00	134.2	0.131	1411	6424	0.475	3.27
31	5.00	139.2	0.131	1447	6578	0.475	3.24
32	5.00	144.2	0.131	1447	6578	0.475	3.24
33	5.00	149.2	0.131	1475	6698	0.475	3.24
34	5.00	154.2	0.131	1475	6698	0.475	3.24
35	5.30	159.2	0.131	1547	6991	0.474	3.13
36	5.30	164.5	0.131	1547	6991	0.474	3.13
37	5.30	169.8	0.131	1655	7180	0.472	2.64
38	5.30	175.1	0.131	1655	7180	0.472	2.64
39	5.75	180.4	0.131	1633	7118	0.472	2.72
40	5.75	186.1	0.131	1633	7118	0.472	2.72

Table 3-3A Subgrade Properties 270-500 Generic Profile - Continued

Layer	Thickness	Depth	Unit Weight	Vs	Vp	Poisson Ratio	Damp.
#	[ft]	[ft]	kcf	ft/sec	ft/sec		%
41	5.75	191.9	0.131	1640	7153	0.472	2.75
42	5.75	197.6	0.131	1640	7153	0.472	2.75
43	8.83	203.4	0.131	1686	7344	0.472	2.71
44	8.83	212.2	0.131	1686	7344	0.472	2.71
45	8.83	221.0	0.131	1640	7182	0.473	2.84
46	8.83	229.9	0.131	1640	7182	0.473	2.84
47	8.83	238.7	0.131	1666	7305	0.473	2.84
48	8.83	247.5	0.131	1666	7305	0.473	2.84
49	9.12	256.4	0.131	1688	7411	0.473	2.85
50	9.12	265.5	0.131	1688	7411	0.473	2.85
51	9.12	274.6	0.131	1718	7535	0.473	2.86
52	9.12	283.7	0.131	1718	7535	0.473	2.86
53	9.12	292.8	0.131	1763	7722	0.472	2.83
54	9.12	302.0	0.131	1763	7722	0.472	2.83
55	9.12	311.1	0.131	1759	7724	0.473	2.87
56	9.12	320.2	0.131	1759	7724	0.473	2.87
57	10.00	329.3	0.131	1751	7705	0.473	2.92
58	10.00	339.3	0.131	1751	7705	0.473	2.92
59	10.00	349.3	0.131	1778	7823	0.473	2.92
60	10.00	359.3	0.131	1778	7823	0.473	2.92
61	10.00	369.3	0.131	1794	7894	0.473	2.93
62	10.00	379.3	0.131	1794	7894	0.473	2.93
63	10.00	389.3	0.131	1780	7850	0.473	2.99
64	10.00	399.3	0.131	1780	7850	0.473	2.99
65	10.00	409.3	0.131	1764	7803	0.473	3.04
66	10.00	419.3	0.131	1764	7803	0.473	3.04
67	10.00	429.3	0.131	1794	7919	0.473	3.02
68	10.00	439.3	0.131	1794	7919	0.473	3.02
69	10.40	449.3	0.131	1781	7884	0.473	3.05
70-82	12.50	459.7	0.134	3153	7423	0.390	0.50
Half-space		622.2	0.134	3153	7423	0.390	0.50

Table 3-3B Subgrade Properties 270-200 Generic Profile

Layer	Thickness	Depth	Unit Weight	Vs	Vp	Poisson Ratio	Damp.
#	[ft]	[ft]	kcf	ft/sec	ft/sec		%
1	4.29	0.0	0.125	1302	5644	0.472	3.03
2	4.29	4.3	0.125	1302	5644	0.472	3.03
3	4.29	8.6	0.125	1334	5800	0.472	3.13
4	4.29	12.9	0.125	1334	5800	0.472	3.13
5	4.29	17.2	0.125	1334	5800	0.472	3.13
6	4.29	21.5	0.125	1303	5710	0.473	3.34
7	4.29	25.7	0.125	1303	5710	0.473	3.34
8	4.29	30.0	0.125	1335	5871	0.473	3.39
9	4.29	34.3	0.125	1335	5871	0.473	3.39
10	4.29	38.6	0.125	1372	6038	0.473	3.41
11	4.69	42.9	0.125	1362	6030	0.473	2.62
12	4.69	47.6	0.125	1362	6030	0.473	2.62
13	4.69	52.3	0.125	1417	6265	0.473	2.58
14	4.69	57.0	0.125	1417	6265	0.473	2.58
15	4.69	61.7	0.125	1450	6405	0.473	2.60
16	4.69	66.4	0.125	1450	6405	0.473	2.60
17	4.69	71.0	0.125	1456	6452	0.473	2.65
18	4.69	75.7	0.125	1456	6452	0.473	2.65
19	4.69	80.4	0.125	1435	6391	0.473	2.77
20	4.69	85.1	0.125	1435	6391	0.473	2.77
21	4.69	89.8	0.125	1416	6325	0.474	2.87
22	4.69	94.5	0.125	1416	6325	0.474	2.87
23	5.00	99.2	0.131	1483	6571	0.473	2.73
24	5.00	104.2	0.131	1483	6571	0.473	2.73
25	5.00	109.2	0.131	1494	6636	0.473	2.76
26	5.00	114.2	0.131	1494	6636	0.473	2.76
27	5.00	119.2	0.131	1534	6804	0.473	2.74
28	5.00	124.2	0.131	1534	6804	0.473	2.74
29	5.00	129.2	0.131	1542	6855	0.473	2.78
30	5.00	134.2	0.131	1542	6855	0.473	2.78
31	5.00	139.2	0.131	1599	7090	0.473	2.72
32	5.00	144.2	0.131	1599	7090	0.473	2.72
33	5.00	149.2	0.131	1544	6888	0.474	2.86
34	5.00	154.2	0.131	1544	6888	0.474	2.86
35-71	12.50	159.2	0.134	3317	7812	0.390	0.50
Half-space		621.7	0.134	3317	7812	0.390	0.50

Table 3-3C Subgrade Properties 560-500 Generic Profile

Layer	Thickness	Depth	Unit Weight	Vs	Vp	Poisson Ratio	Damp.
#	[ft]	[ft]	kcf	ft/sec	ft/sec		%
1	5.00	0.0	0.131	1698	5254	0.442	6.86
2	5.00	5.0	0.131	1698	5254	0.442	6.86
3	6.00	10.0	0.131	1857	5046	0.422	6.59
4	6.00	16.0	0.131	1857	5046	0.422	6.59
5	6.00	22.0	0.131	1857	5046	0.422	6.59
6	7.25	28.0	0.131	1980	5277	0.418	6.75
7	7.25	35.3	0.131	1980	5277	0.418	6.75
8	7.25	42.5	0.131	2039	5408	0.417	6.88
9	7.25	49.8	0.131	2039	5408	0.417	6.88
10	6.00	57.0	0.131	2111	5620	0.418	6.98
11	7.00	63.0	0.131	2111	5620	0.418	6.98
12	7.00	70.0	0.131	2111	5620	0.418	6.98
13	6.00	77.0	0.131	2157	5720	0.417	6.15
14	7.00	83.0	0.131	2157	5720	0.417	6.15
15	7.00	90.0	0.131	2157	5720	0.417	6.15
16	7.50	97.0	0.131	2314	6121	0.417	6.11
17	7.50	104.5	0.131	2314	6121	0.417	6.11
18	7.70	112.0	0.131	2314	6121	0.417	6.11
19	7.50	119.7	0.131	2336	6219	0.418	6.22
20	7.50	127.2	0.131	2336	6219	0.418	6.22
21	7.60	134.7	0.131	2336	6219	0.418	6.22
22	7.50	142.3	0.131	2373	6359	0.419	6.36
23	7.50	149.8	0.131	2373	6359	0.419	6.36
24	7.70	157.3	0.131	2373	6359	0.419	6.36
25	7.00	165.0	0.131	2455	6580	0.419	6.35
26	7.00	172.0	0.131	2455	6580	0.419	6.35
27	7.00	179.0	0.131	2455	6580	0.419	6.35
28	7.00	186.0	0.131	2452	6612	0.420	6.46
29	7.00	193.0	0.131	2452	6612	0.420	6.46
30	7.00	200.0	0.131	2452	6612	0.420	6.46
31	6.25	207.0	0.131	2647	6733	0.409	5.82
32	6.25	213.3	0.131	2647	6733	0.409	5.82
33	6.25	219.5	0.131	2592	6620	0.410	5.93
34	6.25	225.8	0.131	2592	6620	0.410	5.93
35	6.25	232.0	0.131	2719	6915	0.409	5.81
36	6.25	238.3	0.131	2719	6915	0.409	5.81
37	12.50	244.5	0.131	2842	7195	0.408	5.70
38	12.50	257.0	0.131	2836	7187	0.408	5.76
39	12.50	269.5	0.131	2820	7167	0.408	5.83

Table 3-3C Subgrade Properties 560-500 Generic Profile - Continued

Layer	Thickness	Depth	Unit Weight	Vs	Vp	Poisson Ratio	Damp.
#	[ft]	[ft]	kcf	ft/sec	ft/sec		%
40	12.50	282.0	0.131	2844	7229	0.408	5.83
41	12.50	294.5	0.131	2840	7233	0.409	5.89
42	12.50	307.0	0.131	2765	7078	0.410	6.02
43	12.50	319.5	0.131	2739	7027	0.410	6.10
44	12.50	332.0	0.131	2785	7139	0.410	6.07
45	12.50	344.5	0.131	2839	7267	0.410	6.03
46	12.50	357.0	0.131	2768	7117	0.411	6.15
47	12.50	369.5	0.131	2788	7177	0.411	6.17
48	12.50	382.0	0.131	2775	7154	0.411	6.22
49	12.50	394.5	0.131	2758	7126	0.412	6.26
50	6.25	407.0	0.131	2695	6994	0.413	6.38
51	6.25	413.3	0.131	2695	6994	0.413	6.38
52	6.25	419.5	0.131	2675	6963	0.413	6.44
53	6.25	425.8	0.131	2675	6963	0.413	6.44
54	6.50	432.0	0.131	2642	6898	0.414	6.52
55	6.60	438.5	0.131	2642	6898	0.414	6.52
56	7.40	445.1	0.131	2620	6860	0.415	6.57
57	7.50	452.5	0.131	2620	6860	0.415	6.57
58-68	14.00	460.0	0.134	3314	7804	0.390	0.50
Half-space		614.0	0.134	3314	7804	0.390	0.50

Table 3-3D Subgrade Properties 560-200 Generic Profile

Layer	Thickness	Depth	Unit Weight	Vs	Vp	Poisson Ratio	Damp.
#	[ft]	[ft]	kcf	ft/sec	ft/sec		%
1	5.00	0.0	0.131	1552	5161	0.450	7.82
2	5.00	5.0	0.131	1552	5161	0.450	7.82
3	6.00	10.0	0.131	1624	4772	0.435	7.88
4	6.00	16.0	0.131	1624	4772	0.435	7.88
5	6.00	22.0	0.131	1624	4772	0.435	7.88
6	7.25	28.0	0.131	1788	4981	0.426	7.76
7	7.25	35.3	0.131	1788	4981	0.426	7.76
8	7.25	42.5	0.131	1801	5040	0.427	8.03
9	7.25	49.8	0.131	1801	5040	0.427	8.03
10	6.00	57.0	0.131	1937	5378	0.425	7.91
11	7.00	63.0	0.131	1937	5378	0.425	7.91
12	7.00	70.0	0.131	1937	5378	0.425	7.91
13	6.00	77.0	0.131	2018	5603	0.425	6.86
14	7.00	83.0	0.131	2018	5603	0.425	6.86
15	7.00	90.0	0.131	2018	5603	0.425	6.86
16	7.50	97.0	0.131	2158	5852	0.421	6.80
17	7.50	104.5	0.131	2158	5852	0.421	6.80
18	7.70	112.0	0.131	2158	5852	0.421	6.80
19	7.50	119.7	0.131	2188	5898	0.420	6.95
20	7.50	127.2	0.131	2188	5898	0.420	6.95
21	7.70	134.7	0.131	2188	5898	0.420	6.95
22	6.00	142.4	0.131	2144	5741	0.419	7.18
23	6.00	148.4	0.131	2144	5741	0.419	7.18
24	5.60	154.4	0.131	2144	5741	0.419	7.18
25-60	12.50	160.0	0.134	3393	7337	0.364	0.50
Half-space		610.0	0.134	3393	7337	0.364	0.50

Table 3-3E Subgrade Properties 560-100 Generic Profile

Layer	Thickness	Depth	Unit Weight	Vs	Vp	Poisson Ratio	Damp.
#	[ft]	[ft]	kcf	ft/sec	ft/sec		%
1	5	0	0.131	1588	4984	0.444	7.06
2	5	5	0.131	1588	4984	0.444	7.06
3	6	10	0.131	1781	4855	0.422	6.78
4	6	16	0.131	1781	4855	0.422	6.78
5	6	22	0.131	1781	4855	0.422	6.78
6	7.25	28	0.131	1914	5115	0.419	6.84
7	7.25	35.25	0.131	1914	5115	0.419	6.84
8	7.25	42.5	0.131	2027	5376	0.417	6.84
9	7.25	49.75	0.131	2027	5376	0.417	6.84
10	3	57	0.131	2016	5376	0.418	6.97
11 - 54	12.5	60	0.134	3326	7833	0.390	0.50
Half-space		610	0.134	3326	7833	0.390	0.50

Table 3-3F Subgrade Properties 900-200 Generic Profile

Layer	Thickness	Depth	Unit Weight	Vs	Vp	Poisson Ratio	Damp.
#	[ft]	[ft]	kcf	ft/sec	ft/sec		%
1	6.50	0.0	0.134	3237	8188	0.407	3.75
2	6.50	6.5	0.134	3237	8188	0.407	3.75
3	10.00	13.0	0.134	4021	9755	0.398	3.61
4	10.00	23.0	0.134	4021	9755	0.398	3.61
5	11.50	33.0	0.140	4653	10725	0.384	3.59
6	11.50	44.5	0.140	4653	10725	0.384	3.59
7	12.50	56.0	0.140	4793	10559	0.370	3.59
8	12.50	68.5	0.140	4793	10559	0.370	3.59
9	17.00	81.0	0.140	5330	11237	0.355	3.56
10	17.00	98.0	0.140	5330	11237	0.355	3.56
11	21.50	115.0	0.140	5872	11956	0.341	3.49
12	21.50	136.5	0.140	5872	11956	0.341	3.49
13	2.00	158.0	0.140	5918	11871	0.335	3.52
14-32	25.00	160.0	0.157	9264	18165	0.324	0.50
Half-space		635.0	0.157	9264	18165	0.324	0.50

Table 3-3G Subgrade Properties 900-100 Generic Profile

Layer	Thickness	Depth	Unit Weight	Vs	Vp	Poisson Ratio	Damp.
#	[ft]	[ft]	kcf	ft/sec	ft/sec		%
1	13.00	0.0	0.134	3403	8480	0.404	3.60
2	10.00	13.0	0.134	4016	9689	0.396	3.51
3	10.00	23.0	0.134	4016	9689	0.396	3.51
4	11.50	33.0	0.140	4731	10840	0.382	3.46
5	11.50	44.5	0.140	4731	10840	0.382	3.46
6	4.00	56.0	0.140	4930	10793	0.368	3.44
7-30	25.00	60.0	0.157	8936	17520	0.324	0.50
Half-space		660.0	0.157	8936	17520	0.324	0.50

Table 3-3H Subgrade Properties 2032-100 Generic Profile

Layer	Thickness	Depth	Unit Weight	Vs	Vp	Poisson Ratio	Damp.
#	[ft]	[ft]	kcf	ft/sec	ft/sec		%
1	10.00	0.0	0.140	7126	12343	0.250	3.16
2	16.67	10.0	0.140	7333	12701	0.250	3.16
3	16.67	26.7	0.140	7746	13417	0.250	3.16
4	16.66	43.3	0.140	8128	14077	0.250	3.16
5-24	30.00	60.0	0.157	8599	16794	0.322	0.50
Half-space		660.0	0.157	8599	16794	0.322	0.50

Table 3-4 Maximum Frequency of Analysis

Soil Case	Max. Transmitting Freq. of Subgrade				Top Layer Vs	Max. Transmitting Freq. of FE mesh and Cut-off Freq. of Analyses					
						R/B Complex			PS/B		
	No.	d ft	Vs fps	f_{L_max} Hz	fps	d_{FE} ft	f_{FE_max} Hz	f_{cutoff} Hz	d_{FE} fps	f_{FE_max} Hz	f_{cutoff} Hz
270-500	69	10.4	1781	34.2	1242	10	24.8	31	6.3	39.4	33
270-200	35	12.5	3317	53.1	1302	10	26.0	29	6.3	41.3	33
560-500	43	12.5	2739	43.8	1698	10	34.0	31	6.3	53.9	33
560-200	6	7.25	1788	49.3	1552	10	31.0	35	6.3	49.3	33
560-100	6	7.25	1914	52.8	1588	10	31.8	35	6.3	50.4	33
900-200	11	21.5	5872	54.6	3237	14	46.2	50	6.3	102.7	50
900-100	1	13.0	3403	52.3	3403	14	48.6	50	6.3	108.0	50
2032-100	5	30.0	8599	57.3	7333	14	104.8	50	6.3	232.8	50

Table 3-5 Weight of the R/B Complex

Structure	Weight (kips)
PCCV Above Ground Elevation	74,347
CIS Above Ground Elevation	85,738
RCL System	9,553
R/B Above Ground Elevation	277,730
PCCV at Ground Elevation	3,941
R/B at Ground Elevation	116,019
CIS at Ground Elevation	21,801
Basement	187,000
Total Weight of R/B Complex	776,129
Equivalent Uniform Bearing Pressure = 11.96 ksf	

Table 3-6 Weight of the PS/B

Location	Weight (kips)
Roof Level	7,940
Ground Floor Level	12,410
Basemat Level	16,400
Total	36,750
Equivalent Uniform Bearing Pressure = 4.62 ksf	

Table 3-7 R/B Complex and PS/B Input Material Properties

Structural Component	Concrete Compressive Strength (psi)	Young's Modulus ($x10^5$ ksf)	Poisson's Ratio	Damping SSE
PCCV	7,000	6.870	0.17	5%
R/B including FH/A, and Basement	4,000	5.191*	0.17	7%
CIS	4,000	5.191**	0.17	5%
PS/B	4,000	5.191*	0.17	7%

* nominal concrete stiffness of cracked members reduced 50%
** nominal concrete stiffness reduced 25% to consider cracking

Table 3-8 Fixed Base Modal Properties of R/B Complex and PS/B

Structure	Mode	Frequency (Hz)		
		NS	EW	Vertical
PCCV	1	4.5	4.5	12.2
	2	12.8	12.8	16.0
	3	26.2	26.2	17.3
CIS	1	5.0	5.3	14.4
	2	7.5	7.6	18.1
	3	10.0	10.0	18.7
R/B & FH/A	1	5.6	6.0	11.3
	2	7.5	7.3	11.9
	3	9.3	9.0	17.5
PS/B	1	8.7	10.3	13.9
	2	12.8	12.3	16.9
	3	19.9	20.6	26.0
	4	20.2	22.3	33.5
	5	21.4	23.5	36.8

Table 3-9 ISRS for Prestressed Concrete Containment Vessel (PCCV)

ISRS Symbol	Direction	Location		Envelope of ARS at Node
		Description	Elev.	
CV11OR_(x,y,z)	x y z	Top of Dome	230'-2"	CV11
CV10OR_(x,y,z)	x y z	7ft under Dome Top	225'-0"	CV10
CV09OR_(x,y,z)	x y z	Dome El. at 40 deg.	201'-8"	CV09
CV08OR_(x,y,z)	x y z	Dome El. at 15 deg.	173'-1"	CV08
CV07OR_(x,y,z)	x y z	Top of Polar Crane Rail	145'-7"	CV07
CV06OR_(x,y,z)	x y z	Roof of MS/FW Room	115'-6"	CV06
CV05OR_(x,y,z)	x y z	MS Penetration	92'-2"	CV05
CV04OR_(x,y,z)	x y z	Operation Floor Level	76'-5"	CV04
CV03OR_(x,y,z)	x y z	FW Penetration	68'-3"	CV03
CV02OR_(x,y,z)	x y z	R/B 3rd floor level	50'-2"	CV02
CV01OR_(x,y,z)	x y z	R/B 2nd floor level	25'-3"	CV01
CV00OR_(x,y,z)	x y z	PCCV Ground El	1'-11"	CV00

Table 3-10 ISRS for Containment Internal Structure (CIS)

ISRS Symbol	Direction	Location		Envelope of ARS at Nodes
		Description	Elev.	
ICS2OR_(x,y,z)	x y z	Top of SG wall	112'-0"	IC71 IC72
ICS1OR_(x,y,z)	x y z	Middle of SG wall	96’-7”"	IC61 W51 IC62 W52
ICP3OR_(x,y,z)	x y z	Upper Pressurizer	139'-6"	IC09 W7 S5
ICP2OR_(x,y,z)	x y z	Middle Pressurizer	112'-4"	IC08 IC18 W6
ICP1OR_(x,y,z)	x y z	Lower Pressurizer	76'-5"	IC07 S3
IC05OR_(x,y,z)	x y z	Operation floor	76'-5"	IC05 W3 W4 S4
IC15OR_(x,y,z)	x y z	SG Support	59'-2"	IC15
IC04OR_(x,y,z)	x y z	SG Support	50'-2"	IC04 W2 S1 S2 IC14
IC03OR_(x,y,z)	x y z	RV Support	35'-11"	IC03
IC02OR_(x,y,z)	x y z	R/B 2nd Floor Level	25'-3"	IC02 W1 S7 S8
IC01OR_(x,y,z)	x y z	Pressure Header Room	16'-0"	IC01
IC00OR_(x,y,z)	x y z	CIS Ground Level	1'-11"	IC00

Table 3-11 ISRS for Reactor Building (R/B) and Fuel Handling Area (FH/A) Rigid Walls/Slabs

ISRS Symbol	Dir.	Location				Envelope of ARS at Nodes
		Description	N-S CL	EW CL	Elev.	
FH08OR	X Y Z	FH/A Roof	AR-CR	3R-11R	154'-6"	FH08 NE08 NW08 RFS1 5FN1 5FN2 5FE1 5FE2
FH07OR	X Y Z	Top of FH/A crane rail	AR-CR	3R-11R	125'-6"	FH07 NE07 NW07
FH06OR	X Y Z	Center Building Roof	AR-CR	3R-11R	101'-0"	FH06 NE06 NW06
RE05OR	X Y Z	MS/FW Room Roof	HR-LR	1R-11R	115'-6"	RE05 SW05 SE05 RFS2 RFS3 RFS4 RFS5 4FN3 4FE1 4FE2
RE42OR	X Y Z	R/B 5th Floor East Roof	CR-GR	5R-11R	101'-0"	RE42 RFS7 4FN2
RE41OR	X Y Z	R/B 5th Floor West Roof	AR-LR	1R-5R	101'-0"	RE41 RFS6 4FN1 NW04
RE04OR	X Y Z	R/B 5th Floor MS/FW Room	GR-LR	5R-11R	101'-0"	RE04 SW04 SE04
RE03OR	X Y Z	R/B Operation Floor	AR-LR	1R-11R	76'-5"	RE03 SW03 SE03 NE03 NW03
RE02OR	X Y Z	R/B 3rd Floor	AR-LR	1R-11R	50'-2"	RE02 SW02 SE02 NE02 NW02 3FS1 3FS2 3FS3 3FS4 3FS5
RE01OR	X Y Z	R/B 2nd Floor	AR-LR	1R-11R	25'-3"	RE01 SW01 SE01 NE01 NW01 2FS1
RE00OR	X Y Z	R/B Ground Floor	AR-LR	1R-11R	3'-7"	RE00 SW00 SE00 NE00 NW00
BS01OR	X Y Z	R/B Basement	AR-LR	1R-11R	-8'-7"	BS01 SWB1 SEB1 NEB1 NWB1

Table 3-12 ISRS for Reactor Building (R/B) and Fuel Handling Area (FH/A) Flexible Walls/Slabs

ISRS Symbol	Dir.	Description	Elev.	Envelope of ARS at Nodes			
FH08Z1	Z	FH/A Roof, Slab Zone 1	154'-8"	115_10a 115_10e	115_10b	115_10c	115_10d
RE05Z1	Z	MS/FW Room Roof, Slab Zone 1	115'-6"	115_31 115_40	115_32 115_33a	115_33c 115_33b	115_33d
RE05Z2	Z	MS/FW Room Roof, Slab Zone 2	115'-6"	115_30a	115_30b	115_30c	115_30
RE42Z1	Z	R/B 5th Floor East Roof, Slab Zone 1	101'-0"	101_22 101_23	101_23a	101_24a	101_21
RE41Z1	Z	R/B 5th Floor West Roof, Slab Zone 1	101'-0"	101_10a	101_10b		
RE41Z2	Z	R/B 5th Floor West Roof, Slab Zone 2	101'-0"	101_12b	101_41b	101_43a	
RE41Z3	Z	R/B 5th Floor West Roof, Slab Zone 3	101'-0"	101_11	101_40	101_41a	
RE04Z1	Z	R/B 5th Floor MS/FW Room, Slab Zone 1	101'-0"	101_30a	101_33a	101_30	
RE03Z1	Z	R/B Operation Floor, Slab Zone 1	76'-5"	86_17b	76_33b	76_43b	
RE03Z2	Z	R/B Operation Floor, Slab Zone 2	76'-5"	86_14 76_43a	76_10b	76_13	76_21g
RE03Z3	Z	R/B Operation Floor, Slab Zone 3	76'-5"	86_16	76_10c	76_11a	76_20a
RE03Z4	Z	R/B Operation Floor, Slab Zone 4	76'-5"	76_33a 76_31b	76_10a 76_30a	76_40a 76_30b	76_41c 76_30c
RE02Z1	Z	R/B 3rd Floor, Slab Zone 1	50'-2"	50_21b	50_21c	50_21d	50_21e
RE02Z2	Z	R/B 3rd Floor, Slab Zone 2	50'-2"	50_20b	50_22a	50_33d	50_43d
RE02Z3	Z	R/B 3rd Floor, Slab Zone 3	50'-2"	50_30a	50_30b	50_40b	
RE02Z4	Z	R/B 3rd Floor, Slab Zone 4	50'-2"	50_10b	50_32c	50_34	50_44
				50_42e	35_26		
RE01Z1	Z	R/B 2nd Floor, Slab Zone 1	25'-3"	25_30b	25_33b	25_42d	
RE01Z2	Z	R/B 2nd Floor, Slab Zone 2	25'-3"	25_33d	25_34b	25_43d	25_44b
RE01Z3	Z	R/B 2nd Floor, Slab Zone 3	25'-3"	25_20b	25_20d	25_20e	25_20f

Table 3-12 ISRS for Reactor Building (R/B) and Fuel Handling Area (FH/A) Flexible Wall/Slab -Continued

ISRS Symbol	Dir.	Description	Elev.	Envelope of ARS at Nodes			
RE01Z4	Z	R/B 2nd Floor, Slab Zone 4	25'-3"	25_20a	13_31	13_42	
RE01Z5	Z	R/B 2nd Floor, Slab Zone 5	25'-3"	25_20c	25_22e	25_23	13_17
RE00Z1	Z	R/B Ground Floor, Slab Zone 1	3'-7"	3_32a	3_32d		
RE00Z2	Z	R/B Ground Floor, Slab Zone 2	3'-7"	3_32b	3_32c		
RE00Z3	Z	R/B Ground Floor, Slab Zone 3	3'-7"	3_10a	3_20a	3_15c	3_15d
				3_15			
BS01Z1	Z	R/B Basement, Slab Zone 1	-8'-7"	n8_10a	n8_11c	n8_16	
BS01Z2	Z	R/B Basement, Slab Zone 2	-8'-7"	n8_13	n8_14b	n8_21c	n8_22a
				n8_30a	n8_40a		
FH07X1	X	Top Of FH/A Crane Rail, Walls Running E-W	125'-8"	W_N_1a	W_N_1b	W_N_1c	W_N_1d
RE04X1	X	R/B 5th Floor MS/FW Room, Walls Running E-W	101'-0"	W_S_3	W_S_4	W_S_5	W_S_6
				W_P1n	W_P2n		
RE03X1	X	R/B Operation Floor, Walls Running E-W	76'-5"	W_S_9	W_S_10		
RE02X1	X	R/B 3rd Floor, Walls Running E-W	50'-2"	W_N_3	W_N_2		
RE00X1	X	R/B Ground Floor, Walls Running E-W	3'-7"	W_S_21	W_S_22	W_S_25	W_S_26
FH07Y1	Y	Top Of FH/A Crane Rail, Walls Running N-S	125'-8"	W_E_1			
RE42Y1	Y	R/B 5th Floor East Roof, Walls Running N-S	101'-0"	W_E_2	W_E_3		
RE41Y1	Y	R/B 5th Floor West Roof, Walls Running N-S	101'-0"	W_W_2			
RE04Y1	Y	R/B 5th Floor MS/FW Room, Walls Running N-S	101'-0"	W_E_7	W_W_1	W_P1e	W_P1w
				W_P2e	W_P2w		
RE03Y1	Y	R/B Operation Floor, Walls Running N-S	76'-5"	W_E_4a	W_E_4b	W_E_5	W_W_5
				W_W_6			
RE02Y1	Y	R/B 3rd Floor, Walls Running N-S	50'-2"	W_W_8	W_E_6	W_P3e	
RE00Y1	Y	R/B Ground Floor, Walls Running N-S	3'-7"	W_E_8			

Note: See Appendix B for locations of flexible slabs and walls.

Table 3-13 ISRS for Power Source Building (PS/B)

ISRS Symbol	Dir.	Elev.	Description	ARS at Nodes (provide node numbers and x and y coordinates)				
Basemat	XYZ	-26'-4"	Envelope	BM01	BM02	BM03	BM04	BM05
Ground Floor	XY	3'-7"	Envelope	GS01	GS02	GS03	GS04	GS05
				GS06	GS07	GS08	GS09	GS10
				GS11	GS12	GS13		
Roof	XYZ	39'-0"	Envelope	RF01	RF02	RF03	RF04	RF05
GTG B	Z	3'-7"	Envelope	GS14	GS15	GS16	GS17	
GTG C	Z	3'-7"	Envelope	GS18	GS06	GS19	GS20	
GTG D	Z	3'-7"	Envelope	GS21	GS09	GS22	GS23	
GTG C&D Panels	Z	3'-7"	Envelope	GS24	GS25	GS26	GS27	

Table 4-1 Maximum Displacements of PCCV Relative to Free Field

Location				Maximum Displacements (in)		
Node	**x (ft)**	**y (ft)**	**z (ft)**	d_{NS}	d_{EW}	d_V
CV11	0.00	0.00	230.17	1.667	2.104	0.244
CV10	0.00	0.00	225.00	1.649	2.076	0.240
CV09	0.00	0.00	201.67	1.561	1.945	0.234
CV08	0.00	0.00	173.08	1.447	1.776	0.230
CV07	0.00	0.00	145.58	1.333	1.608	0.228
CV06	0.00	0.00	115.50	1.204	1.416	0.226
CV05	0.00	0.00	92.17	1.103	1.267	0.223
CV04	0.00	0.00	76.42	1.034	1.165	0.221
CV03	0.00	0.00	68.25	0.998	1.114	0.220
CV02	0.00	0.00	50.17	0.922	1.000	0.217
CV01	0.00	0.00	25.25	0.821	0.847	0.214
CV00	0.00	0.00	1.92	0.732	0.738	0.210

Table 4-2 Maximum Displacements of CIS Relative to Free Field

Location				Maximum Displacements (in)		
Node	x (ft)	y (ft)	z (ft)	d_{NS}	d_{EW}	d_V
IC09	39.29	0.00	139.50	1.415	1.565	0.245
IC18	39.24	0.00	110.75	1.208	1.362	0.245
IC08	39.29	0.00	112.33	1.220	1.374	0.245
IC05	3.36	0.74	76.42	0.964	1.118	0.215
IC72	7.29	44.03	112.00	1.090	1.336	0.319
IC71	8.11	-43.98	112.00	1.087	1.333	0.318
IC62	3.88	37.65	96.58	1.034	1.243	0.292
IC61	3.94	-37.73	96.58	1.033	1.242	0.292
IC15	3.36	0.74	59.17	0.905	1.019	0.214
IC04	1.92	-0.61	50.17	0.876	0.966	0.212
IC14	1.92	-0.61	45.67	0.859	0.938	0.212
IC03	-2.28	0.13	35.88	0.826	0.881	0.212
IC02	-2.38	-0.18	25.25	0.791	0.824	0.212
IC01	1.22	0.05	16.00	0.766	0.782	0.210
IC00	1.22	0.05	1.92	0.732	0.738	0.209

Table 4-3 Maximum Displacements of R/B and FH/A Relative to Free Field

Location				Maximum Displacements (in)		
Node	**x (ft)**	**y (ft)**	**z (ft)**	d_{NS}	d_{EW}	d_V
FH08	-116.67	17.44	154.50	1.351	1.500	0.448
NE08	-146.58	106.67	154.50	1.351	1.502	0.767
NW08	-146.58	-71.42	154.50	1.352	1.502	0.653
FH07	-120.08	18.37	125.67	1.216	1.357	0.457
RE05	115.42	6.17	115.50	1.092	1.279	0.406
FH06	-120.81	17.41	101.00	1.091	1.228	0.456
RE41	-28.46	-77.07	101.00	1.044	1.219	0.449
RE42	3.48	79.00	101.00	1.043	1.214	0.448
RE04	119.54	-7.83	101.00	1.048	1.210	0.416
RE03	9.95	2.01	76.42	0.968	1.090	0.220
NE03	-146.58	106.67	76.42	0.968	1.093	0.738
NW03	-146.58	-106.67	76.42	0.970	1.093	0.734
SE03	161.67	106.67	76.42	0.968	1.086	0.748
SW03	161.67	-106.67	76.42	0.970	1.086	0.744
RE02	-5.50	-2.93	50.17	0.886	0.962	0.217
RE01	-5.34	-4.09	25.25	0.805	0.839	0.215
RE00	1.24	-0.25	3.58	0.736	0.742	0.209

Table 4-4 Maximum Displacements of PS/B Relative to Free Field

Location	Elevation	Maximum Displacements (in)		
		d_{NS}	d_{EW}	d_V
North West Corner	Roof	0.37	0.23	0.16
South East Corner	Roof	0.37	0.23	0.16
South West Corner	Roof	0.37	0.23	0.17
North East Corner	Roof	0.37	0.23	0.17
North West Corner	Ground Floor	0.23	0.16	0.16
South East Corner	Ground Floor	0.23	0.17	0.16
South West Corner	Ground Floor	0.23	0.16	0.16
North East Corner	Ground Floor	0.23	0.16	0.16
North West Corner	Basemat Top	0.13	0.11	0.14
South East Corner	Basemat Top	0.13	0.11	0.14
South West Corner	Basemat Top	0.13	0.11	0.14
North East Corner	Basemat Top	0.12	0.11	0.14

Table 4-5 SSE Design Loads on PCCV

	Location		Quasi-Static Acceleration Load (g)		
	Node	**Elev. (ft)**	A_{NS}	A_{EW}	A_V
Dome	CV11	230.17	1.80	2.40	2.15
	CV10	225.00	1.80	2.40	1.60
	CV09	201.67	1.70	2.20	1.30
	CV08	173.08	1.55	1.95	1.05
Cylinder Wall	CV07	145.58	1.40	1.65	0.95
	CV06	115.50	1.15	1.35	0.80
	CV05	92.17	1.00	1.10	0.70
	CV04	76.42	0.90	0.95	0.70
	CV03	68.25	0.85	0.90	1.20
	CV02	50.17	0.70	0.70	0.55
	CV01	25.25	0.55	0.50	0.50
Base	CV00	1.92	0.50	0.50	0.50

Table 4-6 SSE Design Loads on CIS

	Location		Quasi-Static Acceleration Load (g)		
	Node	Elev. (ft)	A_{NS}	A_{EW}	A_V
Pressurizing Chamber Wall	IC09	139.50	4.00	2.95	1.90
	IC18	110.75	2.00	1.95	1.70
	IC08	112.33	1.90	1.90	1.60
Below Level of Operating Floor	IC05	76.42	0.80	1.10	0.70
SG Wall	IC72	112.00	2.45	2.20	1.45
	IC71	112.00	2.40	2.10	1.45
	IC62	96.58	1.95	1.95	1.30
	IC61	96.58	1.50	1.45	1.00
Below Level of Operating Floor	IC15	59.17	5.75	1.20	0.60
	IC04	50.17	0.55	0.55	0.55
	IC14	45.67	3.55	3.10	0.50
	IC03	35.88	0.75	0.80	0.65
	IC02	25.25	0.60	0.60	0.65
	IC01	16.00	0.55	0.55	0.50
Base	IC00	1.92	0.50	0.50	0.50

Table 4-7 SSE Design Loads on R/B and FH/A

	Location		Quasi-Static Acceleration Load (g)		
	Node	Elev. (ft)	A_{NS}	A_{EW}	A_V
FH/A	FH08	154.5	2.45	1.55	1.45
	FH07	125.67	1.90	1.30	1.45
	FH06	101	2.10	2.45	2.40
R/B	RE05	115.5	0.85	1.00	0.95
	RE41	101	1.60	1.10	1.05
	RE42	101	1.30	0.75	0.85
	RE04	101	0.60	1.00	0.90
	RE03	76.42	0.75	0.75	0.65
	RE02	50.17	0.55	0.60	0.55
	RE01	25.25	0.55	0.55	0.50
Base	RE00	3.58	0.50	0.50	0.50

Table 4-8 Out-of-Plane SSE Loads on R/B-FH/A Flexible Slabs

Slab Group ID*	Seismic Quasi-Static Load (g)
FH08Z1	3.70
RE05Z2	4.25
RE05Z1	3.00
RE41Z1	3.25
RE41Z3	3.50
RE41Z2	2.50
RE42Z1	3.50
RE04Z1	2.50
RE03Z1	2.00
RE03Z2	2.00
RE03Z3	2.00
RE03Z4	1.50
RE02Z1	2.00
RE02Z2	1.50
RE02Z3	1.50
RE02Z4	1.25
RE01Z1	1.50
RE01Z2	1.25
RE01Z3	1.50
RE01Z4	1.75
RE01Z5	1.00
RE00Z1	1.25
RE00Z2	1.00
RE00Z3	1.00
BS01Z1	1.00
BS01Z2	1.00

Note *: See Appendix B for locations of flexible slabs

Table 4-9 Out-of-Plane SSE Loads on R/B-FH/A Walls

Wall Group ID*	Seismic Quasi-Static Load (g)
Walls Spanning in EW Direction	
FH07x1	2.25
RE04x1	1.50
RE03x1	1.00
RE02x1	1.00
RE00x1	1.00
Walls Spanning in NS Direction	
FH07Y1	2.50
RE42Y1	3.50
RE41Y1	3.00
RE04Y1	1.20
RE03Y1	1.20
RE02Y1	1.00
RE00Y1	0.75

Note *: See Appendix B for locations of flexible walls

Table 4-10 SSE Design Loads on PS/B

Elevation (ft)	Seismic Quasi-Static Load (g)		
	A_{NS}	A_{EW}	A_V
49.20	1.30	1.60	1.48
44.04	1.25	1.49	1.41
38.88	1.19	1.40	1.49
31.21	1.17	1.15	1.01
23.54	1.13	1.07	1.16
16.44	1.04	1.01	0.92
9.35	0.84	0.81	0.90
2.25	0.84	0.69	0.90
-5.33	0.84	0.69	0.68
-10.17	0.82	0.71	0.58
-15.00	0.66	0.62	0.66
-20.67	0.61	0.53	0.49
-26.33	0.52	0.49	0.47
-31.29	0.52	0.49	0.47
-36.25	0.51	0.49	0.46

Table 4-11 Out-of-Plane SSE Loads on PS/B Slabs and Walls

Wall/Slab	Location	Seismic Quasi-Static Load (g)		
		A_{NS}	A_{EW}	A_V
Ground Slab	Between Cl. 4P and 5P	--	--	0.88
	Between Cl. 1P and 4P	--	--	0.94
Roof Slab	El. 39'-6"	--	--	1.49
Wall at CL 1P	Above Ground	--	1.69	--
	Below Ground	--	0.64	--
Wall at CL 2P	Above Ground	--	1.16	--
	Below Ground	--	0.63	--
Wall at CL 5P	Above Ground	--	1.09	--
	Below Ground	--	0.86	--
Wall at CL 3P	Below Ground	--	0.87	--
Wall at CL 4P	Below Ground	--	0.74	--
Wall at CL AP	Above Ground	1.14	--	--
	Below Ground	0.93	--	--
Wall at CL CP	Above Ground	1.14	--	--
	Below Ground	0.75	--	--
Wall at CL BP	Above Ground	0.96	--	--

Table 4-12 Lateral Pressure Distribution

Elevation (ft)	Depth (ft)	Dynamic Pressure(ksf)	Static Pressure (ksf)	Total Pressure (ksf)
2.58	0.00	3.33	0.23	3.56
-0.53	3.11	3.82	0.52	4.34
-5.19	7.77	4.15	0.97	5.12
-8.29	10.87	4.24	1.27	5.51
-12.95	15.53	4.30	1.72	6.02
-16.06	18.64	4.24	2.02	6.26
-20.72	23.30	4.09	2.47	6.56
-23.82	26.40	3.94	2.77	6.70
-28.48	31.06	3.57	3.21	6.79
-31.59	34.17	3.30	3.51	6.81
-36.25	38.83	2.48	3.96	6.44

Table 4-13 Seismic Design Shear and Axial Force Diagrams - PCCV

ELEMENT	SHEAR FORCE (NS) (kips)	SHEAR FORCE (EW) (kips)	AXIAL FORCE (kips)
CV11	1,597	2,129	1,907
CV10	8,975	11,966	8,465
CV09	22,250	29,146	18,617
CV08	35,411	45,704	27,533
CV07	52,073	65,340	38,839
CV06	62,492	77,571	46,087
CV05	70,021	85,853	51,357
CV04	74,196	90,260	54,604
CV03	77,961	94,247	59,920
CV02	83,051	99,337	63,919
CV01	87,577	103,452	68,034

Table 4-14 Seismic Design Shear and Axial Force Diagrams - CIS

ELEMENT	SHEAR FORCE (NS) (kips)	SHEAR FORCE (EW) (kips)	AXIAL FORCE (kips)
IC09	2,864	2,112	1,360
IC08	7,024	6,168	4,896
IC18	7,674	6,818	5,444
IC71	2,496	2,184	1,508
IC72	2,002	1,797	1,185
IC61	5,796	5,374	3,708
IC62	6,214	6,009	3,993
IC05	31,763	34,810	23,714
IC15	33,028	35,074	23,846
IC04	41,223	43,269	32,041
IC14	42,476	44,364	32,217
IC03	49,107	51,436	37,964
IC02	59,547	61,876	49,274
IC01	69,722	72,051	58,524

Table 4-15 Seismic Design Shear and Axial Force Diagrams - R/B and FH/A

ELEMENT	SHEAR FORCE (NS) (kips)	SHEAR FORCE (EW) (kips)	AXIAL FORCE (kips)
FH08	16,219	10,261	9,599
FH07	25,510	16,618	16,690
FH06	29,488	21,298	21,136
RE41	15,120	10,395	9,923
RE42	9,867	5,693	6,452
RE05	15,939	18,596	18,216
RE04	25,899	35,196	33,156
RE03	131,149	123,356	114,671
RE02	170,969	166,796	154,491
RE01	208,699	204,526	188,791

Table 4-16 Seismic Design Shear Diagrams – PS/B

Elevation (ft)	SHEAR FORCE (NS) (kips)	SHEAR FORCE (EW) (kips)
49.21	1284	1580
44.04	2267	2749
38.88	6659	7926
31.21	8036	8230
23.54	9785	9887
16.44	10834	10909
9.35	11685	11723
2.25	16144	16072
-5.33	17212	16764
-10.17	17964	17622
-15.00	19231	19014
-20.67	19917	19708
-26.33	21934	21644
-31.29	25338	24892
-36.25	27008	26507

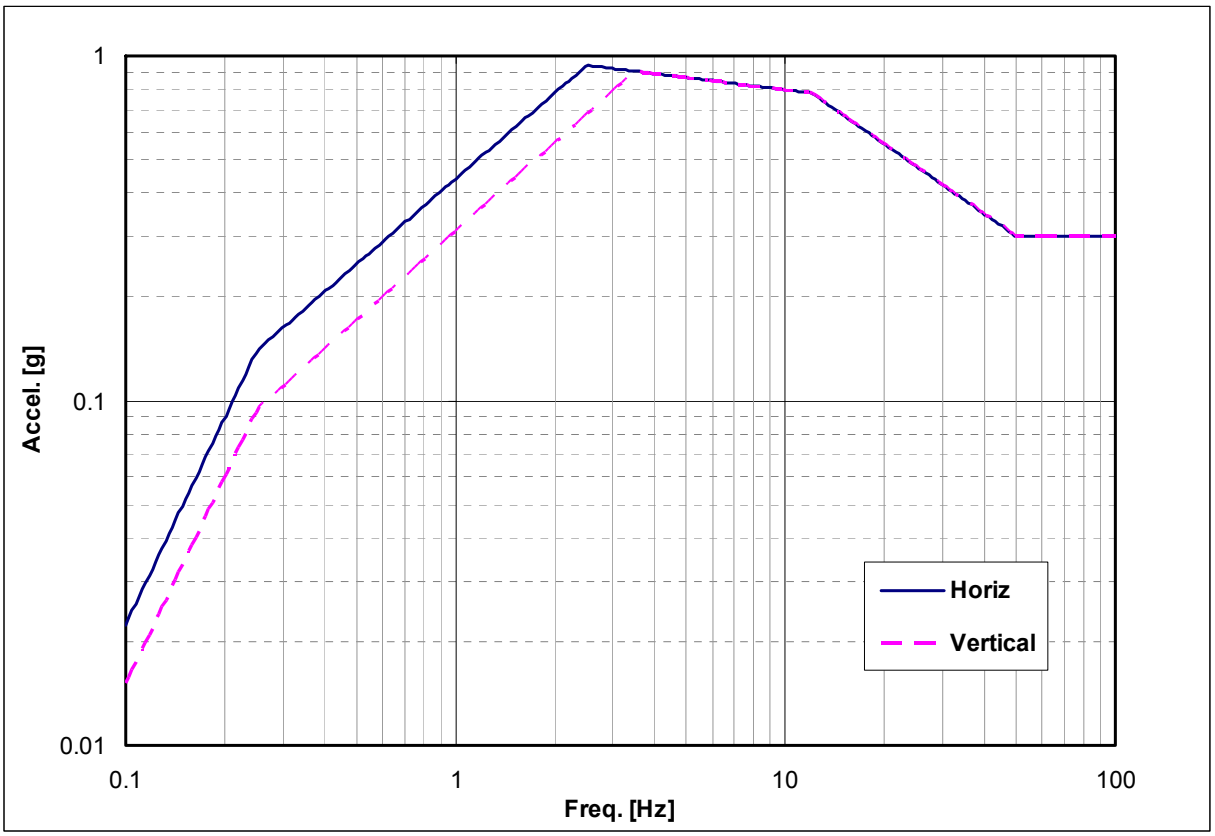

Figure 3-1 US-APWR Certified Seismic Design Response Spectra (CSDRS)

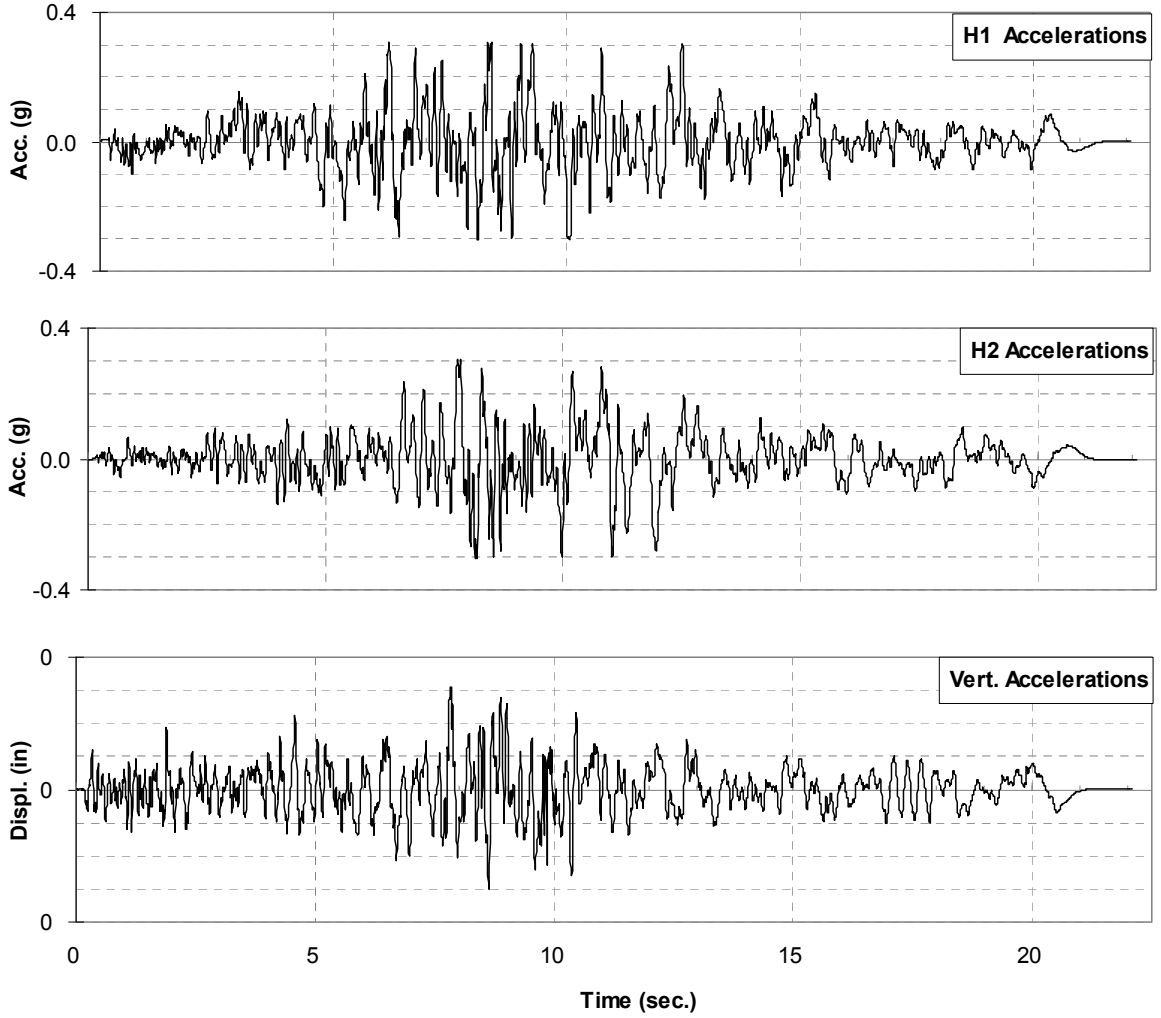

Figure 3-2 US-APWR CSDRS Compatible Acceleration Time Histories

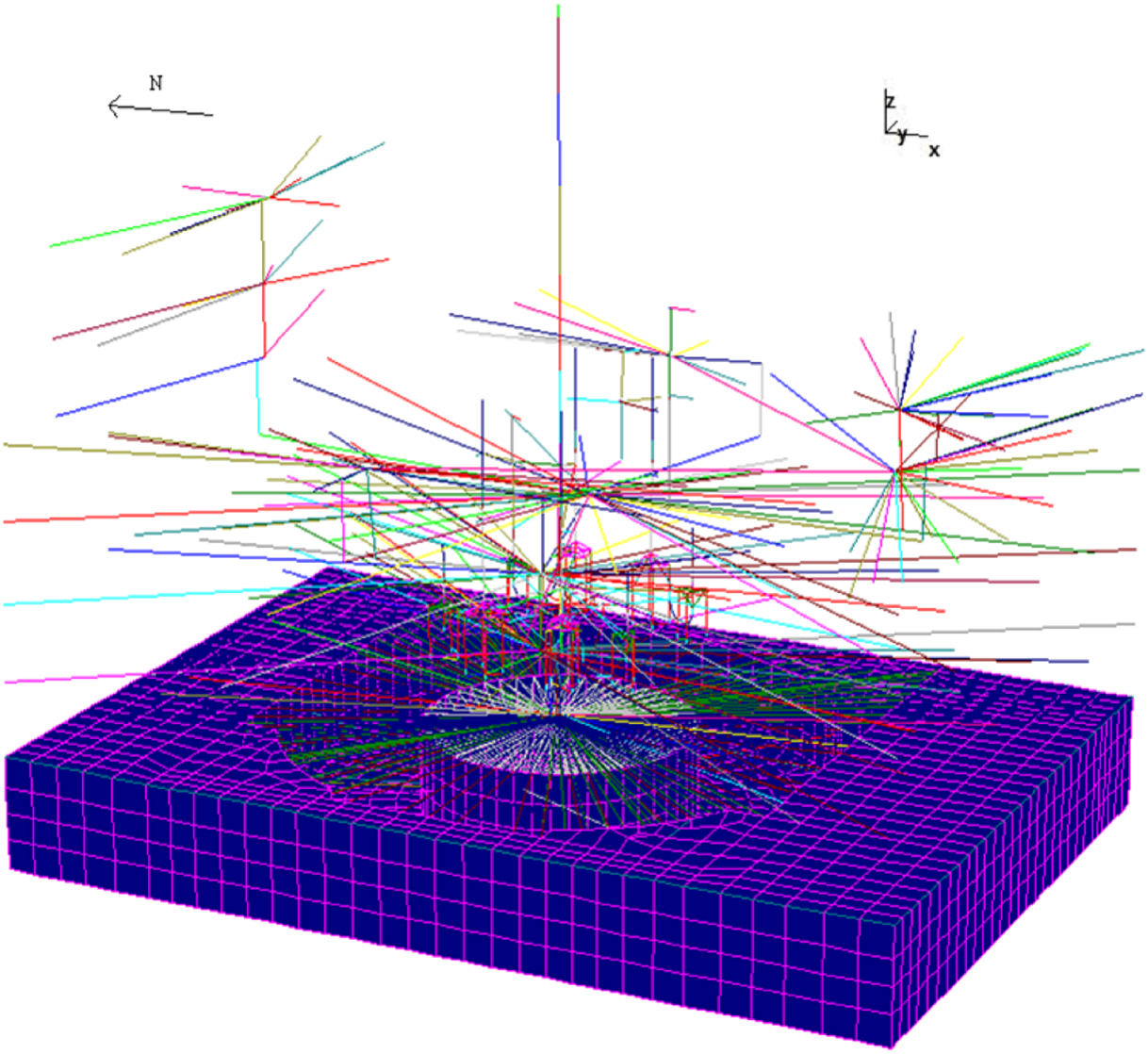

Figure 3-3 ACS SASSI Model of R/B Complex

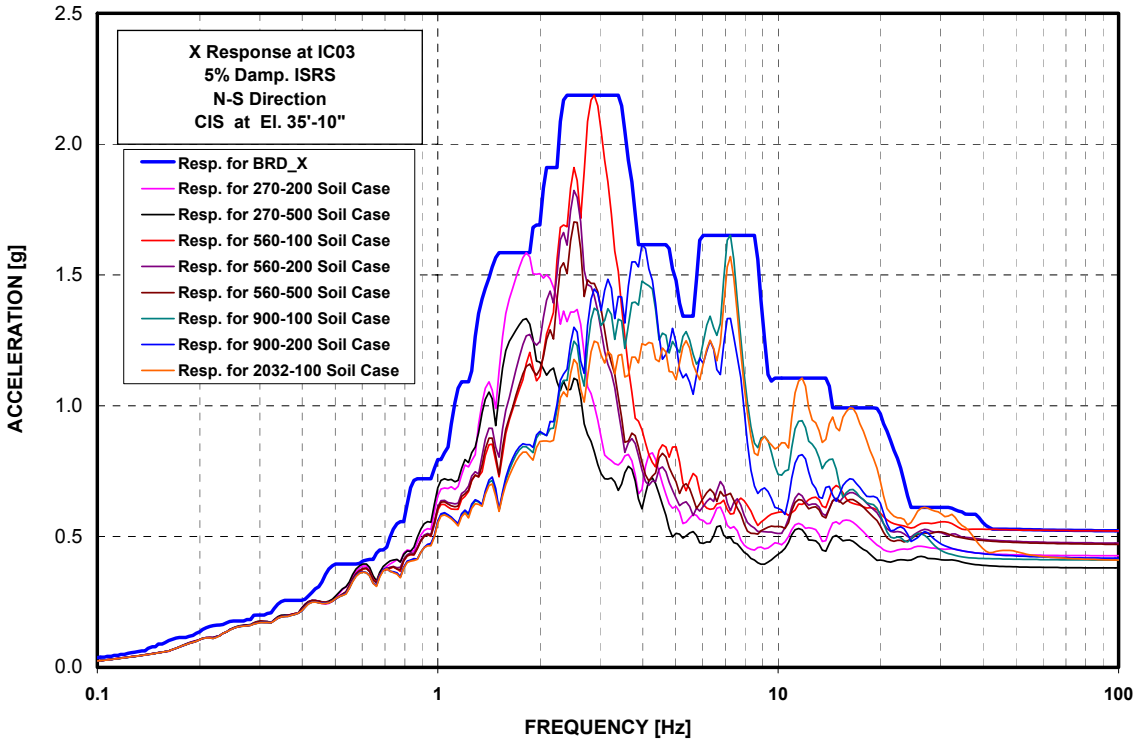

Figure 3-4 Example of ISRS Enveloping and Broadening for IC03 Horizontal Response

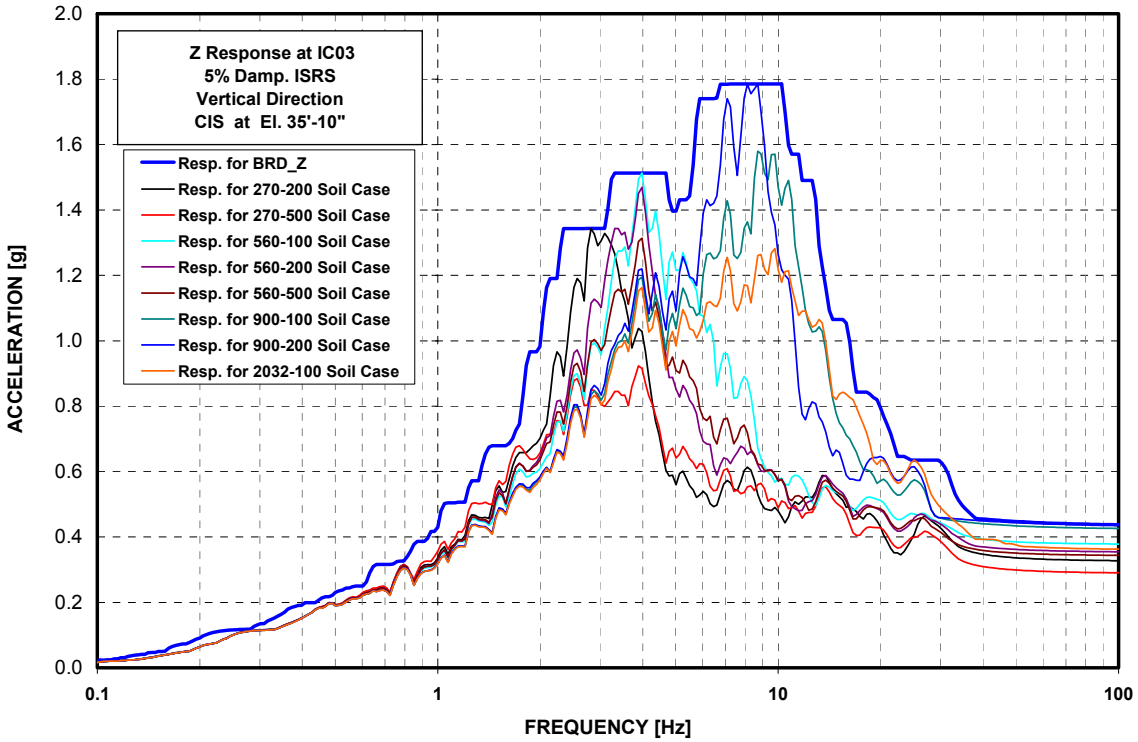

Figure 3-5 Example of ISRS Enveloping and Broadening for IC03 Vertical Response

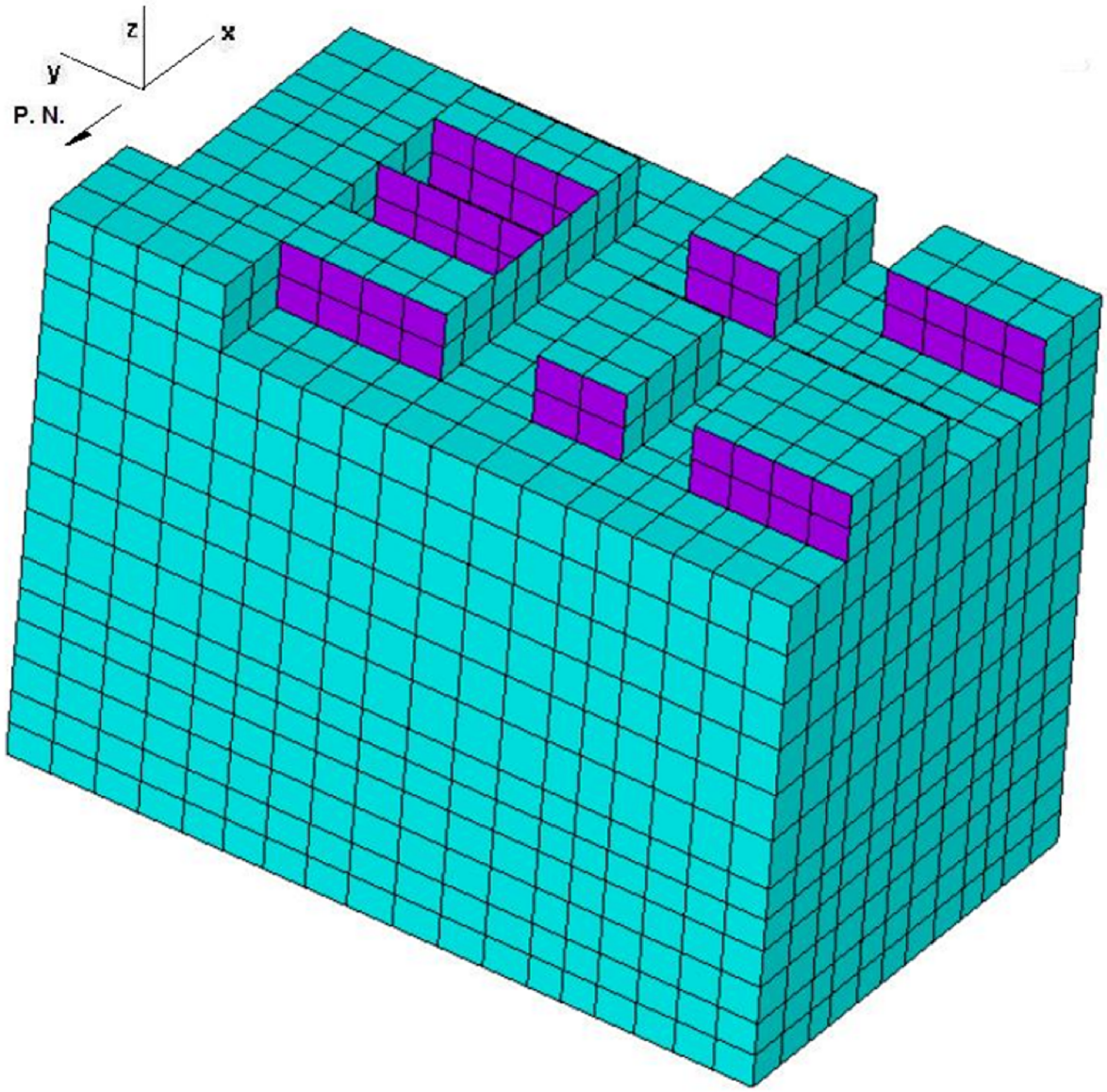

Figure 3-6 ACS SASSI Model of PS/B

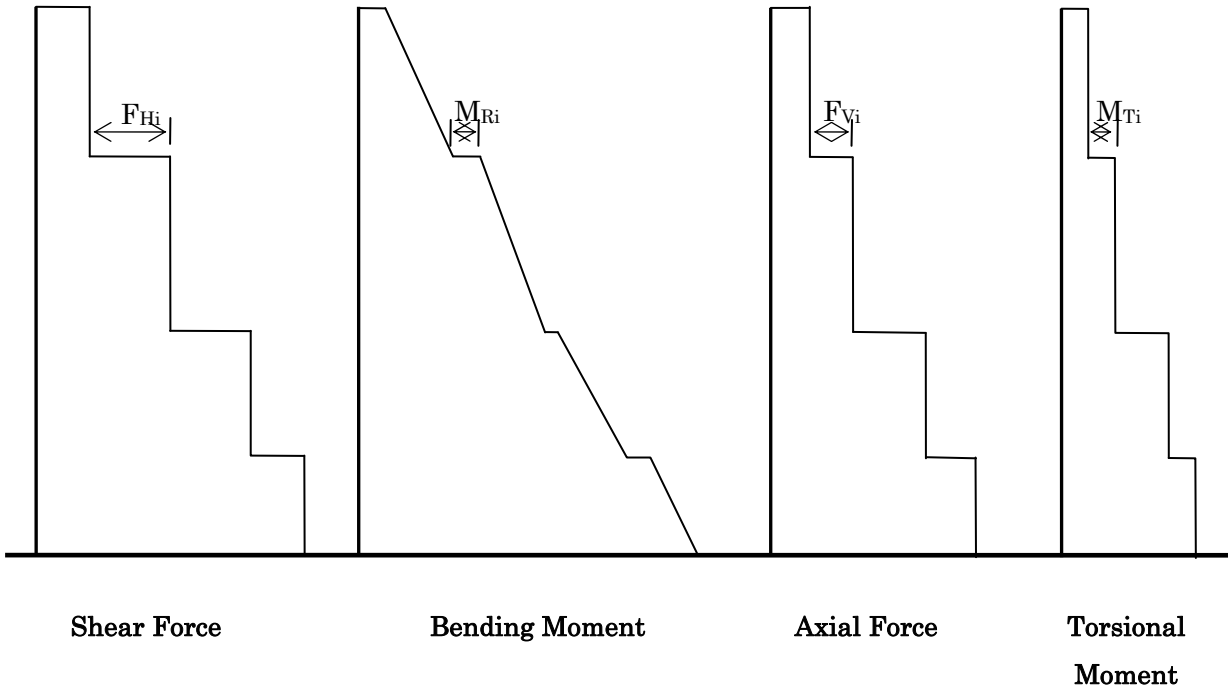

Figure 3-7 Computation of Seismic Floor Loads

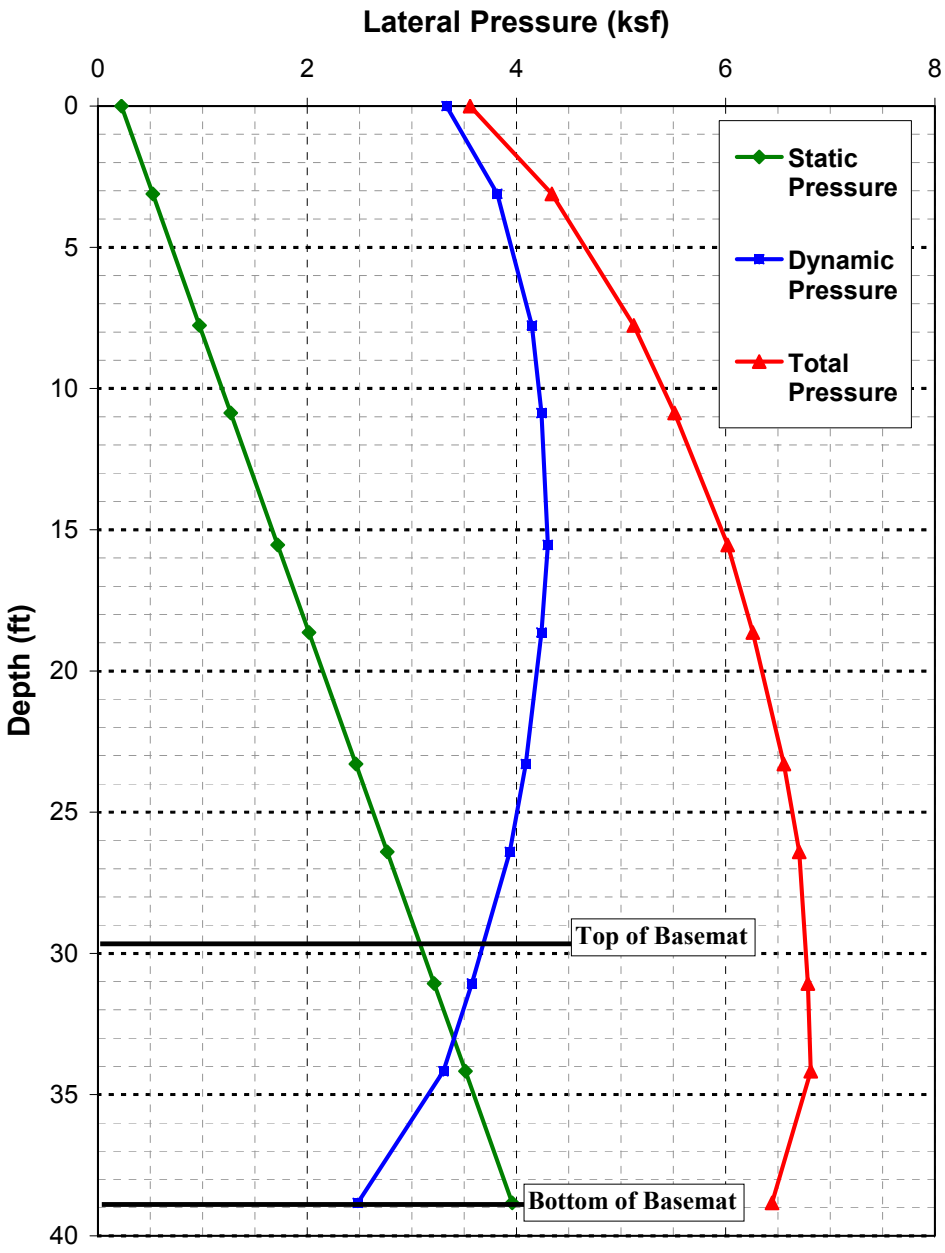

Figure 3-8 Lateral Pressure Distribution on the Exterior Walls

Appendix A

Node Numbering for R/B Complex and PS/B Models

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Table 1 – PCCV Lumped Mass Node Numbers

Symbol	Description	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
CV11	Top of dome	0.00	0.00	230.17	2768	4008
CV10	7ft under dome top	0.00	0.00	225.00	2769	4009
CV09	Dome El. at 40 deg.	0.00	0.00	201.67	2770	4010
CV08	Dome El. at 15 deg.	0.00	0.00	173.08	2771	4011
CV07	Top of polar crane rail	0.00	0.00	145.58	2772	4012
CV06	Roof of MS/FW room	0.00	0.00	115.50	2773	4013
CV05	MS penetration	0.00	0.00	92.17	2774	4014
CV04	Operation floor level	0.00	0.00	76.42	2775	4015
CV03	FW penetration	0.00	0.00	68.25	2776	4016
CV02	R/B 3rd floor level	0.00	0.00	50.17	2777	4017
CV01	R/B 2nd floor level	0.00	0.00	25.25	2778	4018
CV00	PCCV Ground El	0.00	0.00	1.92	2779	4019

Table 2 – CIS Lumped Mass Node Numbers

Symbol	Description	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
IC09	P/R room upper level	39.29	0.00	139.50	2780	4020
IC08	P/R room wall thickness change	39.29	0.00	112.33	2781	4021
IC72	Upper level of SG wall	7.29	44.03	112.00	2807	4047
IC71	Upper level of SG wall	8.11	-43.98	112.00	2806	4046
IC18	P/R support	39.24	0.00	110.75	2782	4022
IC62	Top of SG wall	3.88	37.65	96.58	2785	4025
IC61	Top of SG wall	3.94	-37.73	96.58	2784	4024
IC07	P/R room operation floor	36.25	0.12	76.42	2783	4023
IC05	Operation floor level	3.36	0.74	76.42	2786	4026
IC15	SG support level	3.36	0.74	59.17	2787	4027
IC04	R/B 3rd floor level	1.92	-0.61	50.17	2788	4028
IC14	SG support level	1.92	-0.61	45.67	2789	4029
IC03	Reactor vessel support	-2.28	0.13	35.88	2790	4030
IC02	R/B 2nd floor level	-2.38	-0.18	25.25	2791	4031
IC01	Pressure header room	1.22	0.05	16.00	2792	4032
IC00	CIS Ground Level	1.22	0.05	1.92	2793	4033

Table 3 – R/B & FH/A Lumped Mass Node Numbers

Symbol	Description	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
FH08	FH/A roof	-116.67	17.44	154.50	2794	4034
FH07	Top of FH/A crane rail	-120.08	18.37	125.67	2795	4035
FH06	Center building roof	-120.81	17.41	101.00	2796	4036
RE05	MS/FW room roof	115.42	6.17	115.50	2799	4039
RE04	R/B 5th floor (MS/FW room)	119.54	-7.83	101.00	2800	4040
RE41	R/B 5th floor west roof	-28.46	-77.07	101.00	2797	4037
RE42	R/B 5th floor east roof	3.48	79.00	101.00	2798	4038
RE03	R/B operation floor	9.95	2.01	76.42	2801	4041
RE02	R/B 3rd floor	-5.50	-2.93	50.17	2802	4042
RE01	R/B 2nd floor	-5.34	-4.09	25.25	2803	4043
RE00	RB Ground Floor	1.24	-0.25	3.58	2804	4044
BS01	Basement Lumped Mass	-12.83	-1.58	-23.00	3497	4737

Table 4 – Slab Vertical SDOF Mass Node Numbers

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
FH08	115_10a	-120.48	80.75	154.5	3499	4739
	115_10b	-120.48	-39.42	154.5	3501	4741
	115_10c	-120.48	-4.13	154.5	3503	4743
	115_10d	-120.48	45.25	154.5	3505	4745
	115_10e	-120.48	18.46	153.88	3507	4747
RE05	115_30	94.67	70.5	122.33	3509	4749
	115_30a	79	88.33	122.33	3511	4751
	115_30b	82.35	54.42	122.33	3513	4753
	115_30c	111.33	70.5	122.33	3515	4755
	115_31	143.5	65.92	115.5	3517	4757
	115_32	143.5	99	115.5	3519	4759
	115_33a	94.67	19.42	115.5	3521	4761
	115_33b	94.67	-19.42	115.5	3523	4763
	115_33c	143.5	14	115.5	3525	4765
	115_33d	143.5	-14	115.5	3527	4767
	115_40	143.5	-62.71	115.5	3529	4769

Table 4 – Slab Vertical SDOF Mass Node Numbers- Continued

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
RE41	101_10a	-120.79	-80.17	101	3531	4771
	101_10b	-79	-80.17	101	3533	4773
	101_11	-43.17	-72.38	101	3535	4775
	101_12b	-77.08	-53.75	101	3537	4777
	101_40	39	-76.83	101	3539	4779
	101_41a	68.33	-83.25	101	3541	4781
	101_41b	68.33	-50.17	101	3543	4783
	101_43a	110.5	-50.17	101	3545	4785
RE42	101_21	-57.79	40.54	112	3547	4787
	101_22	-70.08	57.63	112	3549	4789
	101_23	-56.58	79.63	112	3551	4791
	101_23a	-56.58	79.63	112	3553	4793
	101_24a	-56.58	99.08	112	3555	4795
RE04	101_30	42.5	73.75	101	3557	4797
	101_30a	42.5	73.75	101	3559	4799
	101_33a	110.5	81.58	101	3561	4801

Table 4 – Slab Vertical SDOF Mass Node Numbers- Continued

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
RE03	86_14	-74.83	-81.08	88.42	3563	4803
	86_16	-77.08	-54.67	85.25	3565	4805
	86_17b	-82.21	-26.71	86.92	3567	4807
	76_10a	-43.17	-76.83	76.5	3569	4809
	76_10b	-78.83	-80.42	76.5	3571	4811
	76_10c	-78.83	-54	76.5	3573	4813
	76_11a	-100.42	-98.58	76.5	3575	4815
	76_13	-81.83	1.67	76.5	3577	4817
	76_20a	-58.33	76.71	76.5	3579	4819
	76_21g	-142.63	76.71	76.5	3581	4821
	76_30a	52	65.83	76.5	3583	4823
	76_30b	52	65.83	76.5	3585	4825
	76_30c	52	65.83	76.5	3587	4827
	76_31b	87.67	19.42	76.5	3589	4829
	76_33a	110.5	62.75	76.5	3591	4831
	76_33b	143.5	62.75	76.5	3593	4833
	76_40a	52	-65.5	76.5	3595	4835
	76_41c	87.67	-19.42	76.5	3597	4837
	76_43a	110.5	-62.71	76.5	3599	4839
	76_43b	143.5	-62.71	76.5	3601	4841

Table 4 – Slab Vertical SDOF Mass Node Numbers- Continued

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
RE02	50_10b	-78.83	-65.75	50.17	3603	4843
	50_20b	-78.83	75.88	50.17	3605	4845
	50_21b	-132.42	98.58	50.17	3607	4847
	50_21c	-142.88	75.88	50.17	3609	4849
	50_21d	-116.88	75.88	50.17	3611	4851
	50_21e	-132.42	52.88	50.17	3613	4853
	50_22a	-87.46	20.83	50.17	3615	4855
	50_30a	42.5	77	50.17	3617	4857
	50_30b	71.83	82.67	50.17	3619	4859
	50_32c	110.5	56	50.17	3621	4861
	50_33d	143.5	59.88	50.17	3623	4863
	50_34	127	19.42	50.17	3625	4865
	50_40b	71.83	-81.08	50.17	3627	4867
	50_42e	110.5	-54.42	50.17	3629	4869
	50_43d	143.5	-58.29	50.17	3631	4871
	50_44	127	-19.42	50.17	3633	4873
	35_26	0	100.08	40.67	3635	4875

Table 4 – Slab Vertical SDOF Mass Node Numbers- Continued

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
RE01	25_20a	-121.5	29.73	25.25	3637	4877
	25_20b	-132.42	52.88	25.25	3639	4879
	25_20c	-104.92	59.67	25.25	3641	4881
	25_20d	-142.88	75.88	25.25	3643	4883
	25_20e	-119.71	75.88	25.25	3645	4885
	25_20f	-132.42	98.58	25.25	3647	4887
	25_22e	-78.83	75.88	25.25	3649	4889
	25_23	-43.17	75.88	25.25	3651	4891
	25_30b	42.5	77	25.25	3653	4893
	25_33b	116.5	56	25.25	3655	4895
	25_33d	143.5	56	25.25	3657	4897
	25_34b	133	19.42	25.25	3659	4899
	25_42d	139.5	-95.79	25.25	3661	4901
	25_43d	143.5	-54.42	25.25	3663	4903
	25_44b	133	-19.42	25.25	3665	4905
	13_17	-127.04	-54.25	14.33	3667	4907
	13_31	149.42	95.79	14.08	3669	4909
	13_42	143.5	-95.79	14.08	3671	4911

Table 4 – Slab Vertical SDOF Mass Node Numbers- Continued

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
RE00	3_32a	133	54.42	3.58	3673	4913
	3_32b	133	19.42	3.58	3675	4915
	3_32c	133	-19.42	3.58	3677	4917
	3_32d	133	-54.42	3.58	3679	4919
	3_10a	-78.83	-75.88	3.58	3681	4921
	3_20a	-78.83	76.88	3.58	3683	4923
	3_15c	-127.92	-41.25	3.58	3685	4925
	3_15d	-127.92	-23.29	3.58	3687	4927
	3_15	-131.54	39.04	3.58	3689	4929
BS01	n8_10a	-84.33	-70.83	-8.58	3691	4931
	n8_11c	-100.42	-95.79	-8.58	3693	4933
	n8_13	-127.04	-74.04	-8.58	3695	4935
	n8_14b	-127.04	-40.42	-8.58	3697	4937
	n8_16	-127.04	7.25	-8.58	3699	4939
	n8_21c	-104.92	67.5	-8.58	3701	4941
	n8_22a	-84.33	64.58	-8.58	3703	4943
	n8_30a	84.67	64.58	-8.58	3705	4945
	n8_40a	84.67	-70.83	-8.58	3707	4947

Table 5 – N-S Walls Horizontal SDOF Mass Node Numbers

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
FH07	W_N_1a	-152.17	21.06	114.31	3709	4949
	W_N_1b	-152.17	-35.69	114.31	3711	4951
	W_N_1c	-152.17	79.81	114.31	3713	4953
	W_N_1d	-152.17	18.46	114.31	3715	4955
RE04	W_S_3	161.67	-19.42	88.58	3725	4965
	W_S_4	161.67	19.42	88.58	3727	4967
	W_S_5	161.67	-61.88	94.29	3729	4969
	W_S_6	161.67	61.88	94.29	3731	4971
	W_P1n	127	61.88	92.63	3733	4973
	W_P2n	127	-61.88	92.63	3735	4975
RE03	W_S_9	161.67	-61.88	61.63	3721	4961
	W_S_10	161.67	61.88	61.63	3723	4963
RE02	W_N_3	-147.25	76.71	36.04	3719	4959
	W_N_2	-147.25	-41.04	49.17	3717	4957
RE00	W_S_21	161.67	-19.42	-11.38	3737	4977
	W_S_22	161.67	19.42	-11.38	3739	4979
	W_S_25	161.67	-88.33	-11.38	3741	4981
	W_S_26	161.67	18.33	-11.38	3743	4983

Table 6 – E-W Walls Horizontal SDOF Mass Node Numbers

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
FH07	W_E_1	-120.48	106.67	114.31	3745	4985
RE42	W_E_2	-37.83	106.67	92.54	3777	5017
	W_E_3	18.5	106.67	87.04	3779	5019
RE41	W_W_2	-9.5	-106.67	83.96	3775	5015
RE04	W_E_7	144.33	106.67	94.29	3763	5003
	W_W_1	145.08	-106.67	94.29	3765	5005
	W_P1e	144.33	84.92	92.63	3767	5007
	W_P1w	144.33	38.83	92.63	3769	5009
	W_P2e	144.33	-38.83	92.63	3771	5011
	W_P2w	144.33	-84.92	92.63	3773	5013
RE03	W_E_4a	-44.4	106.67	61.63	3757	4997
	W_E_4b	-44.4	106.67	61.63	3759	4999
	W_E_5	41.92	106.67	61.63	3761	5001
	W_W_5	38.96	-106.67	61.63	3753	4993
	W_W_6	-47.83	-106.67	61.63	3755	4995
RE02	W_W_8	-65.17	-106.67	36.04	3747	4987
	W_E_6	-44.4	106.67	36.04	3749	4989
	W_P3e	-128.08	-13.92	47.53	3751	4991
RE00	W_E_8	-131.54	106.67	-11.38	3781	5021

Table 7 – R/B and FH/A Outrigger Node Numbers

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
FH08	NE08	-146.58	106.67	154.5	2869	4109
	NW08	-146.58	-71.42	154.5	2875	4115
	RFS1	-120.48	17.63	154.5	2902	4142
	5FN1	-120.48	-70	154.5	2909	4149
	5FN2	-120.48	105	154.5	2910	4150
	5FE1	-151.29	17.63	154.5	2911	4151
	5FE2	-89.67	17.63	154.5	2912	4152
FH07	NE07	-146.58	106.67	125.67	2870	4110
	NW07	-146.58	-71.42	125.67	2876	4116
FH06	NE06	-146.58	106.67	101	2871	4111
	NW06	-146.58	-71.42	101	2877	4117
RE05	SW05	161.67	-106.67	115.5	2859	4099
	SE05	161.67	106.67	115.5	2864	4104
	RFS2	144.29	-13.58	115.5	2903	4143
	RFS3	144.29	13.58	115.5	2904	4144
	RFS4	93.88	71.92	115.5	2905	4145
	RFS5	143.5	95.5	115.5	2906	4146
	4FN3	143.5	105	115.5	2915	4155
	4FE1	160	-19.42	115.5	2916	4156
	4FE2	160	19.42	115.5	2917	4157
RE42	RFS7	-56.4	81.96	101	2908	4148
	4FN2	6	105	101	2914	4154
RE41	RFS6	-119.79	-82.46	101	2907	4147
	4FN1	-32.21	-105	101	2913	4153

Table 7 – R/B and FH/A Outrigger Node Numbers- Continued

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
RE04	SW04	161.67	-106.67	101	2860	4100
	SE04	161.67	106.67	101	2865	4105
	NW04	-146.58	-106.67	101	2878	4118
RE03	SW03	161.67	-106.67	76.42	2861	4101
	SE03	161.67	106.67	76.42	2866	4106
	NE03	-146.58	106.67	76.42	2872	4112
	NW03	-146.58	-106.67	76.42	2879	4119
RE02	SW02	161.67	-106.67	50.17	2862	4102
	SE02	161.67	106.67	50.17	2867	4107
	NE02	-146.58	106.67	50.17	2873	4113
	NW02	-146.58	-106.67	50.17	2880	4120
	3FS1	110.21	55.88	50.17	2918	4158
	3FS2	127	19.42	50.17	2919	4159
	3FS3	127	-19.42	50.17	2920	4160
	3FS4	110.21	-55.88	50.17	2921	4161
	3FS5	-79.67	77.17	50.17	2922	4162
RE01	SW01	161.67	-106.67	25.25	2863	4103
	SE01	161.67	106.67	25.25	2868	4108
	NE01	-146.58	106.67	25.25	2874	4114
	NW01	-146.58	-106.67	25.25	2881	4121
	2FS1	131.5	-19.42	25.25	2923	4163
RE00	SW00	161.67	-106.67	0.67	2743	3978
	SE00	161.67	106.67	0.67	2767	4007
	NE00	-147.25	106.67	0.67	2297	3355
	NW00	-147.25	-106.67	0.67	2273	3326
BS01	SWB1	161.67	-106.67	-17.83	1820	2705
	SEB1	161.67	106.67	-17.83	1844	2734
	NEB1	-147.25	106.67	-17.83	1526	2345
	NWB1	-147.25	-106.67	-17.83	1502	2316

Table 8 – CIS Outrigger Node Numbers

Floor	Symbol	Location (ft)			Node Numbers	
		X	Y	Z	14' Mesh	10' Mesh
IC09	W7	48.25	0.00	139.50	2931	4171
	S5	40.50	0.00	139.50	2936	4176
	S6	38.58	0.00	139.50	2937	4177
IC08	W6	47.75	0.00	112.33	2930	4170
IC61	W51	14.33	-47.83	96.58	2928	4168
IC62	W52	14.33	47.83	96.58	2929	4169
IC05	W3	38.33	38.42	76.42	2926	4166
	W4	3.33	17.50	76.42	2927	4167
	S3	61.25	0.00	76.42	2934	4174
	S4	46.92	48.08	76.42	2935	4175
IC04	W2	38.33	38.42	50.17	2925	4165
	S1	61.25	0.00	50.17	2932	4172
	S2	47.33	47.58	50.17	2933	4173
IC02	W1	71.00	0.00	25.25	2924	4164
	S7	0.00	-59.58	25.25	2938	4178
	S8	59.58	0.00	25.25	2939	4179

Table 9 – PS/B Node Numbers

Floor	Symbol	Location (ft)			Node Numbers
		X	Y	Z	
Basemat	BM01	-34.67	-57.42	-26.33	495
	BM02	34.67	-57.42	-26.33	507
	BM03	0.00	5.09	-26.33	631
	BM04	-34.67	57.42	-26.33	729
	BM05	34.67	57.42	-26.33	741
Ground Floor	GS01	-34.67	-57.42	2.25	1296
	GS02	34.67	-57.42	2.25	1308
	GS03	-17.33	-45.25	2.25	1325
	GS04	17.50	-45.25	2.25	1331
	GS05	-17.33	-15.87	2.25	1390
	GS06	-17.33	17.92	2.25	1455
	GS07	0.00	5.09	2.25	1432
	GS08	17.50	-15.87	2.25	1396
	GS09	17.50	17.92	2.25	1461
	GS10	-17.33	43.92	2.25	1507
	GS11	17.50	43.92	2.25	1513
	GS12	-34.67	57.42	2.25	1530
	GS13	34.67	57.42	2.25	1542
	GS14	-11	-39.172	2.25	1339
	GS15	-5.5	-39.172	2.25	1340
	GS16	0	-39.172	2.25	1341
	GS17	6.335	-39.172	2.25	1342
	GS18	-17.33	24.17	2.25	1468
	GS19	-17.33	11.505	2.25	1442
	GS20	-17.33	5.09	2.25	1429
	GS21	17.5	24.17	2.25	1474
	GS22	17.5	11.505	2.25	1448
	GS23	17.5	5.09	2.25	1435
	GS24	-11	43.918	2.25	1508
	GS25	22	43.918	2.25	1514
	GS26	22	-33.09	2.25	1358
	GS27	22	-27.915	2.25	1371
Roof	RF01	-34.67	-57.42	38.88	1918
	RF02	34.67	-57.42	38.88	1930
	RF03	0.00	5.09	38.88	2054
	RF04	-34.67	57.42	38.88	2146
	RF05	34.67	57.42	38.88	2158

Appendix B

R/B Complex Node Grouping for ISRS Plots

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Table 1 – ISRS for Prestressed Concrete Containment Vessel (PCCV)

ISRS Symbol	Direction	Location		Envelope of ARS at Node
		Description	Elev.	
CV11OR_(x,y,z)	x y z	Top of Dome	230'-2"	CV11
CV10OR_(x,y,z)	x y z	7ft under Dome Top	225'-0"	CV10
CV09OR_(x,y,z)	x y z	Dome El. at 40 deg.	201'-8"	CV09
CV08OR_(x,y,z)	x y z	Dome El. at 15 deg.	173'-1"	CV08
CV07OR_(x,y,z)	x y z	Top of Polar Crane Rail	145'-7"	CV07
CV06OR_(x,y,z)	x y z	Roof of MS/FW Room	115'-6"	CV06
CV05OR_(x,y,z)	x y z	MS Penetration	92'-2"	CV05
CV04OR_(x,y,z)	x y z	Operation Floor Level	76'-5"	CV04
CV03OR_(x,y,z)	x y z	FW Penetration	68'-3"	CV03
CV02OR_(x,y,z)	x y z	R/B 3rd floor level	50'-2"	CV02
CV01OR_(x,y,z)	x y z	R/B 2nd floor level	25'-3"	CV01
CV00OR_(x,y,z)	x y z	PCCV Ground El	1'-11"	CV00

Table 2 – ISRS for Containment Internal Structure (CIS)

ISRS Symbol	Direction	Location		Envelope of ARS at Nodes					
		Description	Elev.						
ICSGOR_(x,y,z)	x y z	Top of SG wall	112'-0"	IC61	W51	IC62	W52	IC71	IC72
ICP3OR_(x,y,z)	x y z	Upper Pressurizer	139'-6"	IC09	W7	S5			
ICP2OR_(x,y,z)	x y z	Middle Pressurizer	112'-4"	IC08	IC18	W6			
ICP1OR_(x,y,z)	x y z	Lower Pressurizer	76'-5"	IC07	S3				
IC05OR_(x,y,z)	x y z	Operation floor	76'-5"	IC05	W3	W4	S4		
IC15OR_(x,y,z)	x y z	SG Support	59'-2"	IC15					
IC04OR_(x,y,z)	x y z	SG Support	50'-2"	IC04	W2	S1	S2	IC14	
IC03OR_(x,y,z)	x y z	RV Support	35'-9"	IC03					
IC02OR_(x,y,z)	x y z	R/B 2nd Floor Level	25'-3"	IC02	W1	S7	S8		
IC01OR_(x,y,z)	x y z	Pressure Header Room	16'-0"	IC01					
IC00OR_(x,y,z)	x y z	CIS Ground Level	1'-11"	IC00					

Table 3 – ISRS for Reactor Building (R/B) and Fuel Handling Area (FHA) Rigid Walls/Slabs

ISRS Symbol	Dir.	Location				Envelope of ARS at Nodes			
		Description	N-S CL	EW CL	Elev.				
FH08OR	X Y Z	FH/A Roof	AR-CR	3R-11R	154'-8"	FH08 5FN1	NE08 5FN2	NW08 5FE1	RFS1 5FE2
FH07OR	X Y Z	Top of FH/A crane rail	AR-CR	3R-11R	125'-4"	FH07	NE07	NW07	
FH06OR	X Y Z	Center Building Roof	AR-CR	3R-11R	101'-0"	FH06	NE06	NW06	
RE05OR	X Y Z	MS/FW Room Roof	HR-LR	1R-11R	115'-6"	RE05 RFS3 4FE1	SW05 RFS4 4FE2	SE05 RFS5	RFS2 4FN3
RE42OR	X Y Z	R/B 5th Floor East Roof	CR-HR	5R-11R	101'-0"	RE42	RFS7	4FN2	
RE41OR	X Y Z	R/B 5th Floor West Roof	AR-LR	1R-5R	101'-0"	RE41	RFS6	4FN1	NW04
RE04OR	X Y Z	R/B 5th Floor MS/FW Room	GR-LR	5R-11R	101'-0"	RE04	SW04	SE04	
RE03OR	X Y Z	R/B Operation Floor	AR-LR	1R-11R	76'-5"	RE03 NW03	SW03	SE03	NE03
RE02OR	X Y Z	R/B 3rd Floor	AR-LR	1R-11R	50'-2"	RE02 NW02 3FS4	SW02 3FS1 3FS5	SE02 3FS2	NE02 3FS3
RE01OR	X Y Z	R/B 2nd Floor	AR-LR	1R-11R	25'-3"	RE01 NW01	SW01 2FS1	SE01	NE01
RE00OR	X Y Z	R/B Ground Floor	AR-LR	1R-11R	3'-7"	RE00 NW00	SW00	SE00	NE00
BS01OR	X Y Z	R/B Basement	AR-LR	1R-11R	-8'-7"	BS01 NWB1	SWB1	SEB1	NEB1

Table 4 – ISRS for Reactor Building (R/B) and Fuel Handling Area (FHA) Flexible Walls/Slabs

ISRS Symbol	Dir.	Description	Elev.	Envelope of ARS at Nodes			
FH08Z1	Z	FH/A Roof, Slab Zone 1	154'-8"	115_10a 115_10e	115_10b	115_10c	115_10d
RE05Z1	Z	MS/FW Room Roof, Slab Zone 1	115'-6"	115_31 115_40	115_32 115_33a	115_33c 115_33b	115_33d
RE05Z2	Z	MS/FW Room Roof, Slab Zone 1	115'-6"	115_30a	115_30b	115_30c	115_30
RE42Z1	Z	R/B 5th Floor East Roof, Slab Zone 1	101'-0"	101_22 101_23	101_23a	101_24a	101_21
RE41Z1	Z	R/B 5th Floor West Roof, Slab Zone 1	101'-0"	101_10a	101_10b		
RE41Z2	Z	R/B 5th Floor West Roof, Slab Zone 1	101'-0"	101_12b	101_41b	101_43a	
RE41Z3	Z	R/B 5th Floor West Roof, Slab Zone 1	101'-0"	101_11	101_40	101_41a	
RE04Z1	Z	R/B 5th Floor MS/FW Room, Slab Zone 1	101'-0"	101_30a	101_33a	101_30	
RE03Z1	Z	R/B Operation Floor, Slab Zone 1	76’-5”	86_17b	76_33b	76_43b	
RE03Z2	Z	R/B Operation Floor, Slab Zone 1	76’-5”	86_14 76_43a	76_10b	76_13	76_21g
RE03Z3	Z	R/B Operation Floor, Slab Zone 1	76’-5”	86_16	76_10c	76_11a	76_20a
RE03Z4	Z	R/B Operation Floor, Slab Zone 1	76’-5”	76_33a 76_31b	76_10a 76_30a	76_40a 76_30b	76_41c 76_30c
RE02Z1	Z	R/B 3rd Floor, Slab Zone 1	50’-2”	50_21b	50_21c	50_21d	50_21e
RE02Z2	Z	R/B 3rd Floor, Slab Zone 1	50’-2”	50_20b	50_22a	50_33d	50_43d
RE02Z3	Z	R/B 3rd Floor, Slab Zone 1	50’-2”	50_30a	50_30b	50_40b	
RE02Z4	Z	R/B 3rd Floor, Slab Zone 1	50’-2”	50_10b	50_32c	50_34	50_44
				50_42e	35_26		
RE01Z1	Z	R/B 2nd Floor, Slab Zone 1	25’-3”	25_30b	25_33b	25_42d	
RE01Z2	Z	R/B 2nd Floor, Slab Zone 1	25’-3”	25_33d	25_34b	25_43d	25_44b
RE01Z3	Z	R/B 2nd Floor, Slab Zone 1	25’-3”	25_20b	25_20d	25_20e	25_20f

Table 4 – ISRS for Reactor Building (R/B) and Fuel Handling Area (FHA) Flexible Walls/Slabs-Continued

ISRS Symbol	Dir.	Description	Elev.	Envelope of ARS at Nodes			
RE01Z4	Z	R/B 2nd Floor, Slab Zone 1	25’-3”	25_20a	13_31	13_42	
RE01Z5	Z	R/B 2nd Floor, Slab Zone 1	25’-3”	25_20c	25_22e	25_23	13_17
RE00Z1	Z	Rb Ground Floor, Slab Zone 1	3’-7”	3_32a	3_32d		
RE00Z2	Z	Rb Ground Floor, Slab Zone 1	3’-7”	3_32b	3_32c		
RE00Z3	Z	Rb Ground Floor, Slab Zone 1	3’-7”	3_10a	3_20a	3_15c	3_15d
				3_15			
BS01Z1	Z	R/B Basement, Slab Zone 1	-8’-7”	n8_10a	n8_11c	n8_16	
BS01Z2	Z	R/B Basement, Slab Zone 1	-8’-7”	n8_13	n8_14b	n8_21c	n8_22a
				n8_30a	n8_40a		
FH07X1	X	Top Of FH/A Crane Rail, Walls Running E-W	125'-4"	W_N_1a	W_N_1b	W_N_1c	W_N_1d
RE04X1	X	R/B 5th Floor MS/FW Room, Walls Running E-W	101'-0"	W_S_3	W_S_4	W_S_5	W_S_6
				W_P1n	W_P2n		
RE03X1	X	R/B Operation Floor, Walls Running E-W	76'-5"	W_S_9	W_S_10		
RE02X1	X	R/B 3rd Floor, Walls Running E-W	50'-2"	W_N_3	W_N_2		
RE00X1	X	R/B Ground Floor, Walls Running E-W	3'-7"	W_S_21	W_S_22	W_S_25	W_S_26
FH07Y1	Y	Top Of FH/A Crane Rail, Walls Running N-S	125'-4"	W_E_1			
RE42Y1	Y	R/B 5th Floor East Roof, Walls Running N-S	101'-0"	W_E_2	W_E_3		
RE41Y1	Y	R/B 5th Floor West Roof, Walls Running N-S	101'-0"	W_W_2			
RE04Y1	Y	R/B 5th Floor MS/FW Room, Walls Running N-S	101'-0"	W_E_7	W_W_1	W_P1e	W_P1w
				W_P2e	W_P2w		
RE03Y1	Y	R/B Operation Floor, Walls Running N-S	76'-5"	W_E_4a	W_E_4b	W_E_5	W_W_5
				W_W_6			
RE02Y1	Y	R/B 3rd Floor, Walls Running N-S	50'-2"	W_W_8	W_E_6	W_P3e	
RE00Y1	Y	RB Ground Floor, Walls Running N-S	3'-7"	W_E_8			

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 1 – ISRS Symbol at Elevation 3’-7”

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 2 – ISRS Symbol at Elevation 13’-6”

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 3 – ISRS Symbol at Elevation 25’-3”

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 4 – ISRS Symbol at Elevation 35’-2”

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 5 – ISRS Symbol at Elevation 50’-2”

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 6 – ISRS Symbol at Elevation 65’-0”

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 7 – ISRS Symbol at Elevation 76’-5”

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 8 – ISRS Symbol at Elevation 86’-4”

Security-Related Information – Withheld Under 10 CFR 2.390

Figure 9 – ISRS Symbol at Elevation 101'-0"

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 10 – ISRS Symbol at Elevation 115’-6”

Appendix C

ISRS Plots for PCCV

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Figure 34 – CV09 ISRS Vertical Direction C-34
Figure 35 – CV10 ISRS Vertical Direction C-35
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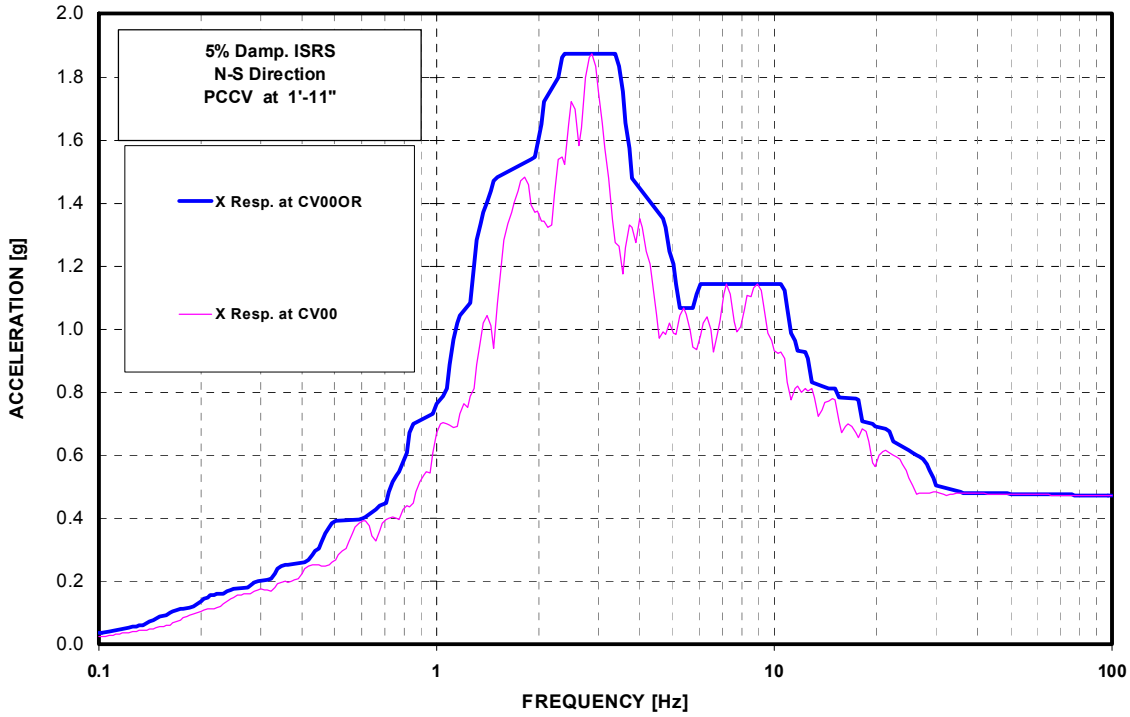


Figure 1 – CV00 ISRS N-S Direction

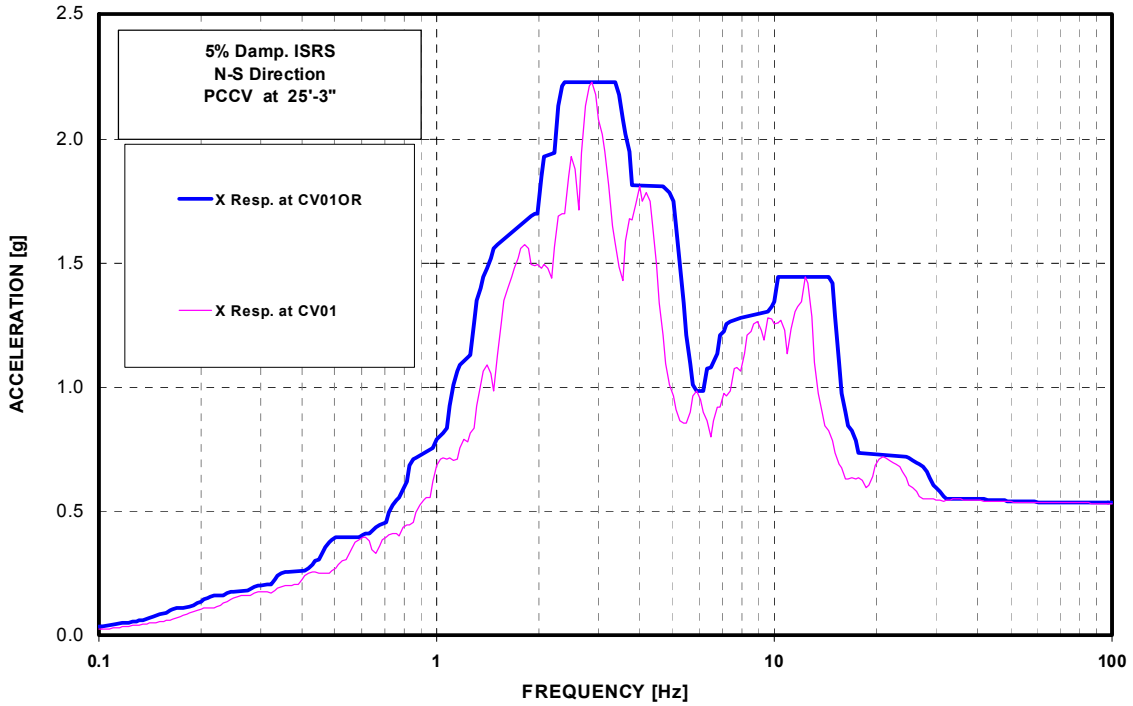


Figure 2 – CV01 ISRS N-S Direction

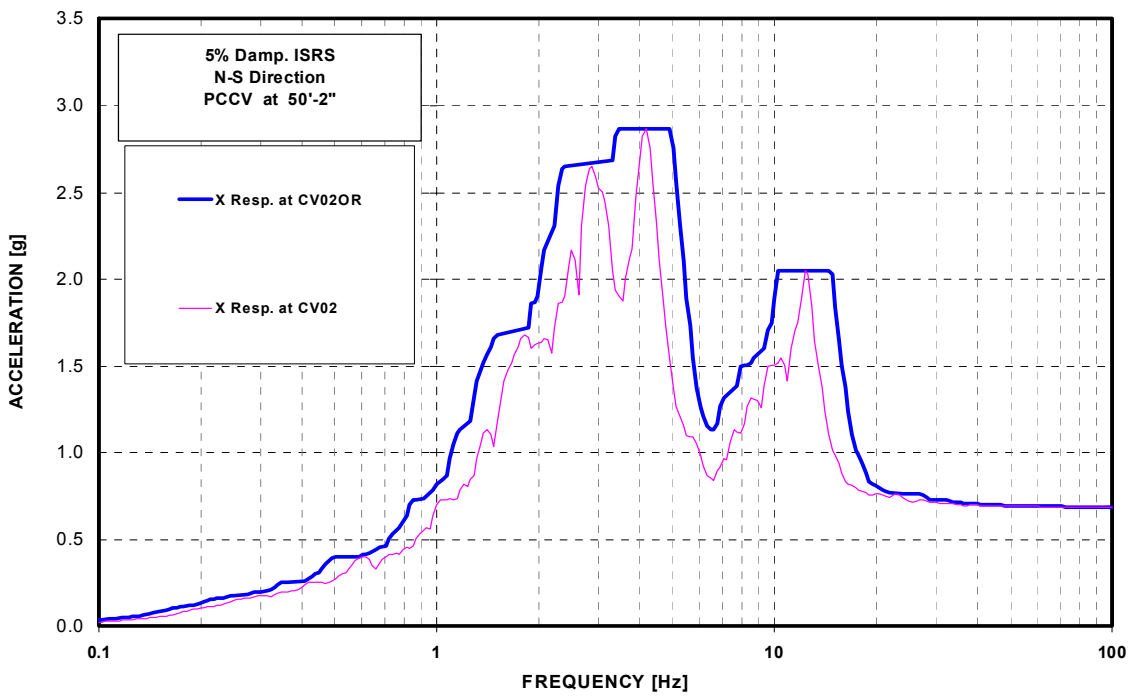


Figure 3 – CV02 ISRS N-S Direction

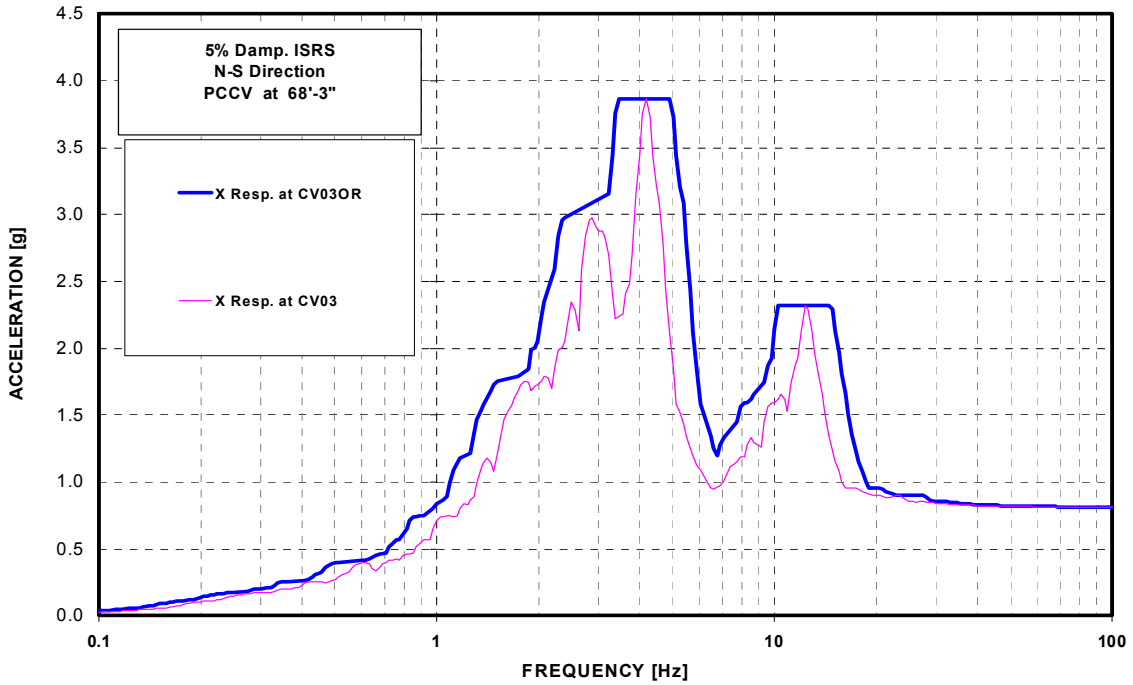


Figure 4 – CV03 ISRS N-S Direction

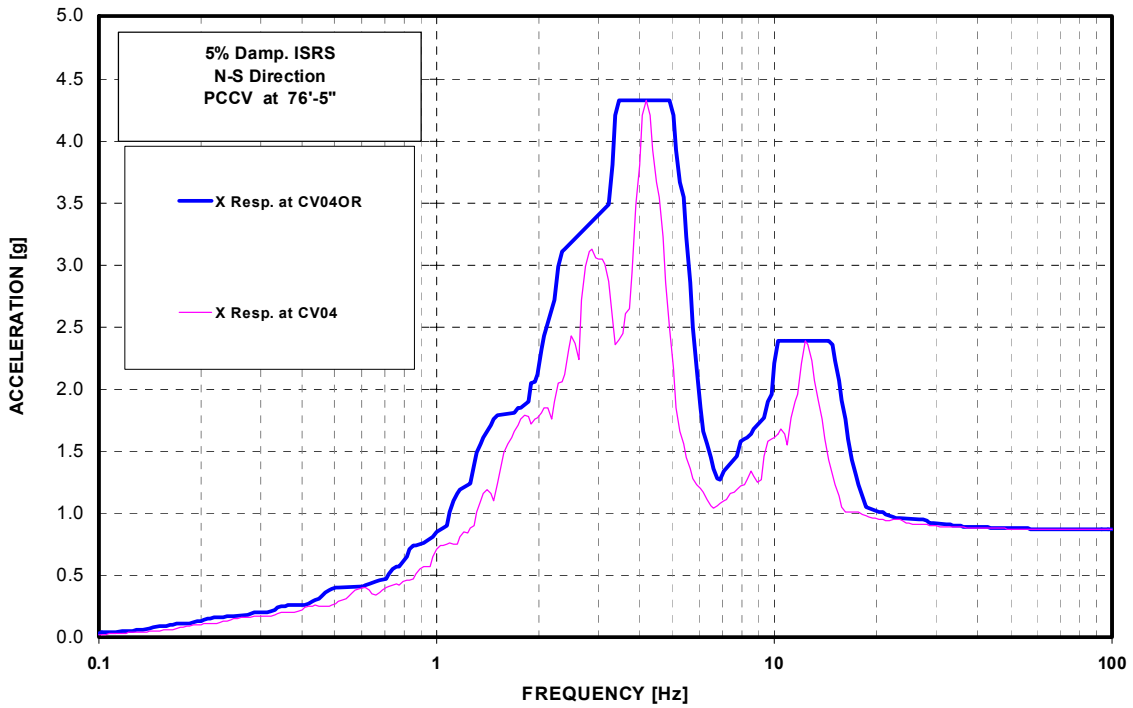


Figure 5 – CV04 ISRS N-S Direction

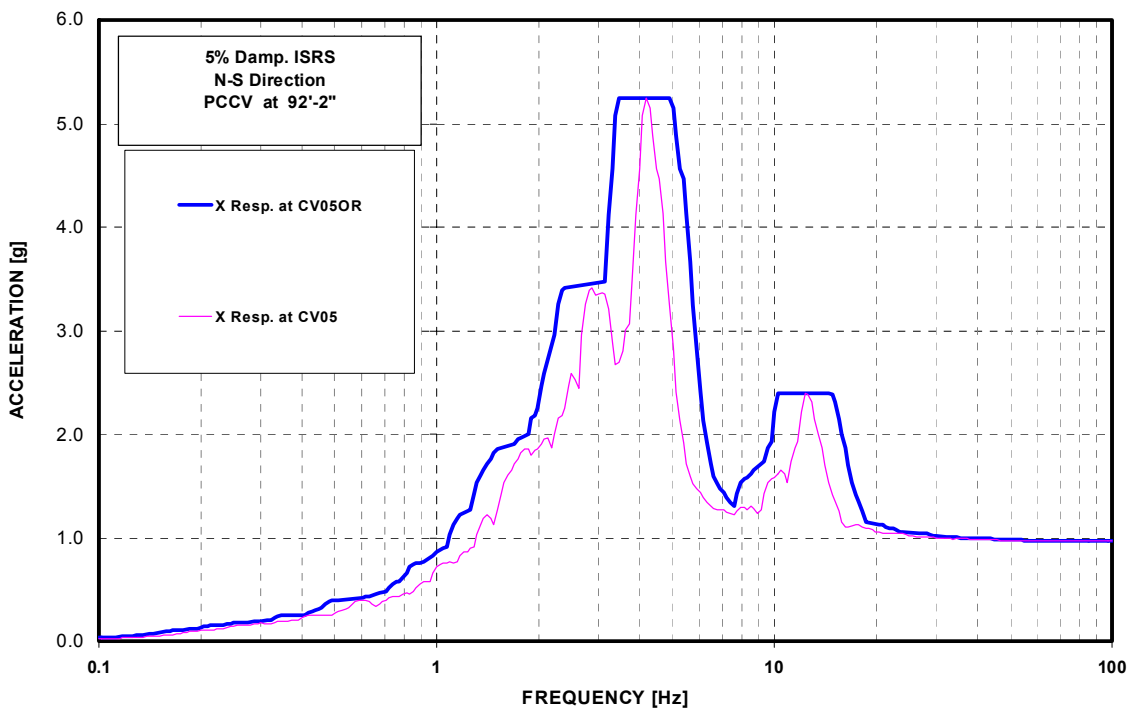


Figure 6 – CV05 ISRS N-S Direction

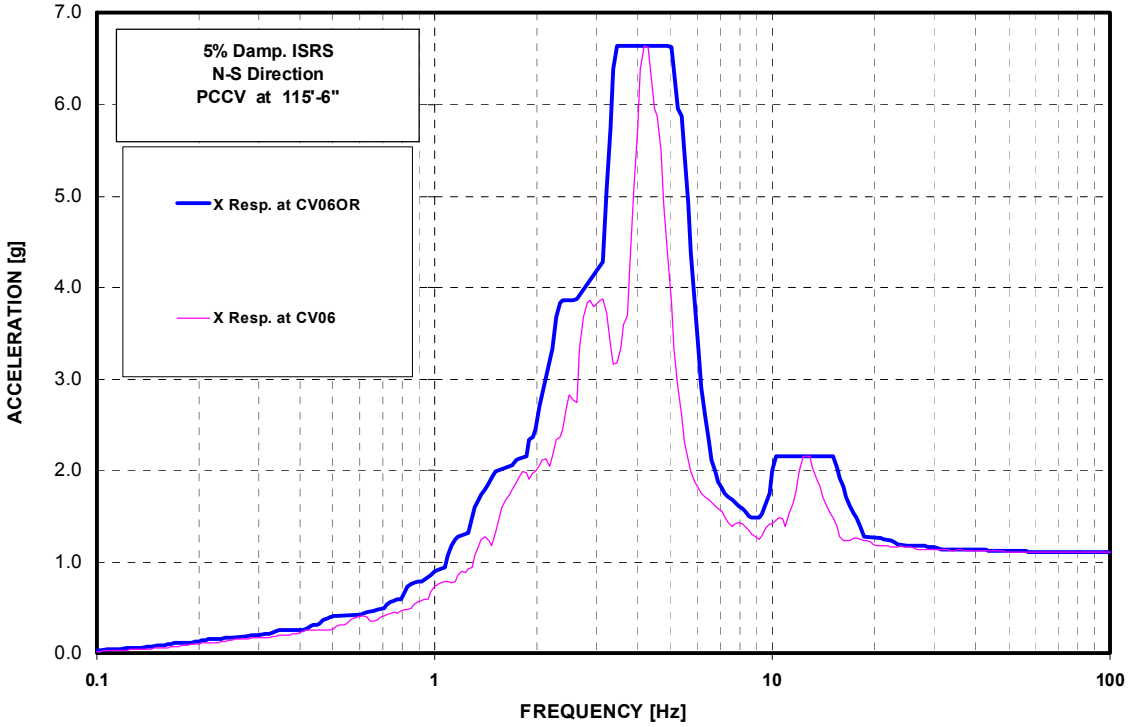


Figure 7 – CV06 ISRS N-S Direction

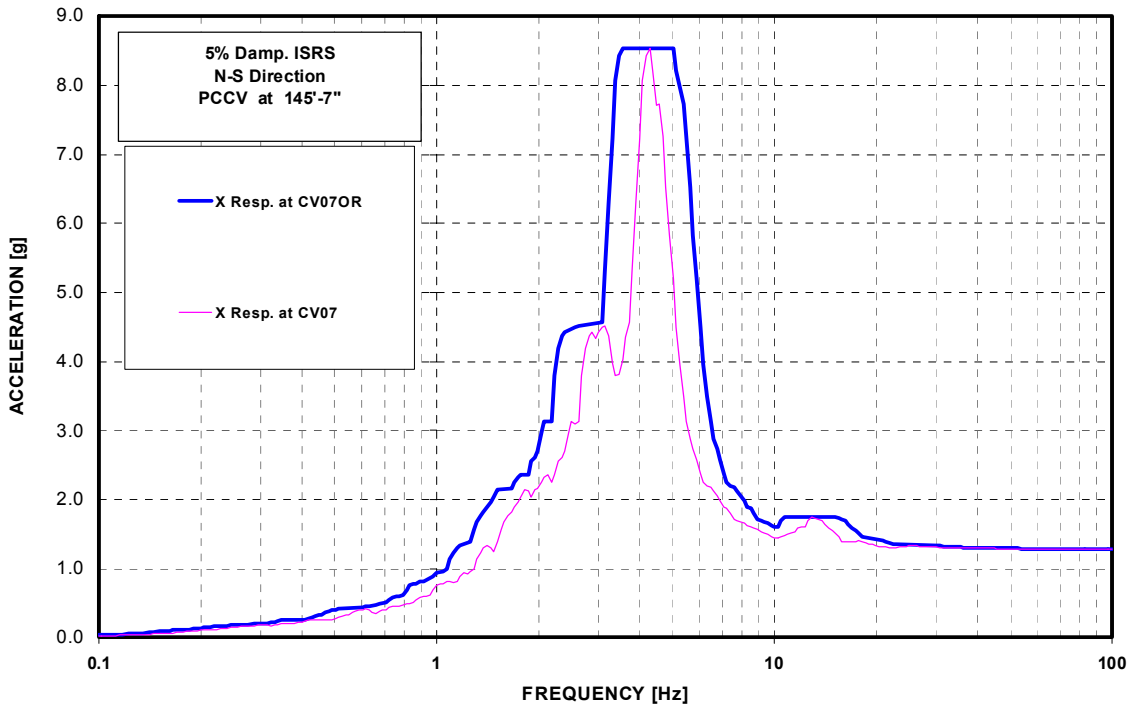


Figure 8 – CV07 ISRS N-S Direction

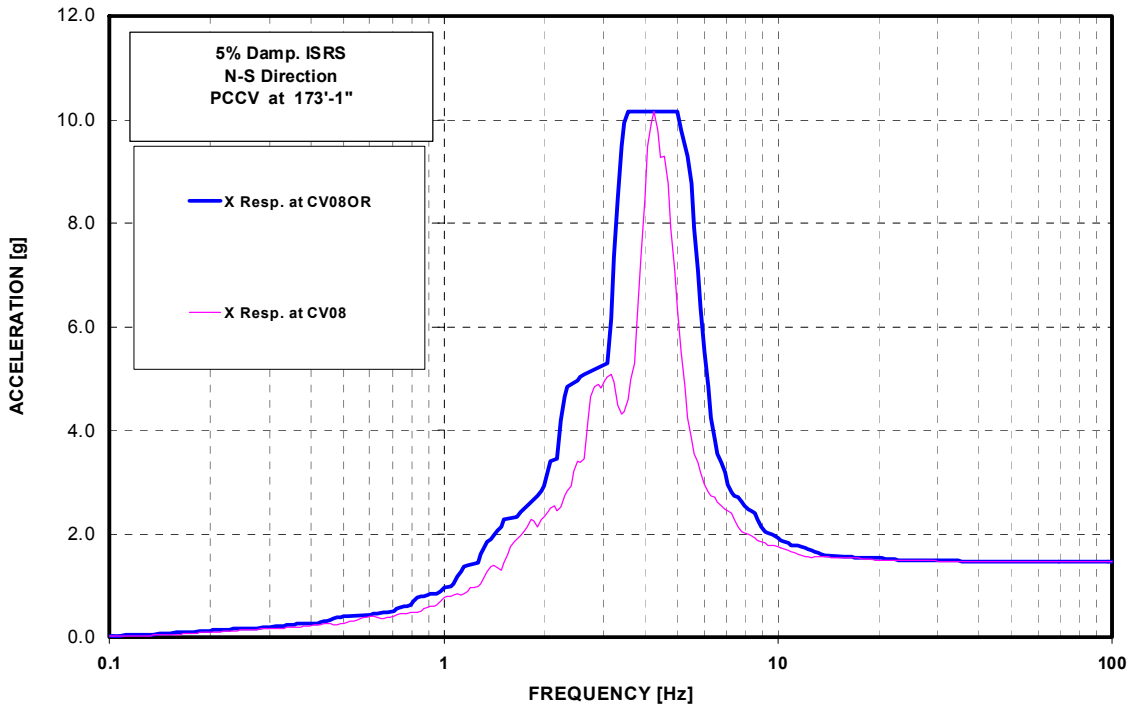


Figure 9 – CV08 ISRS N-S Direction

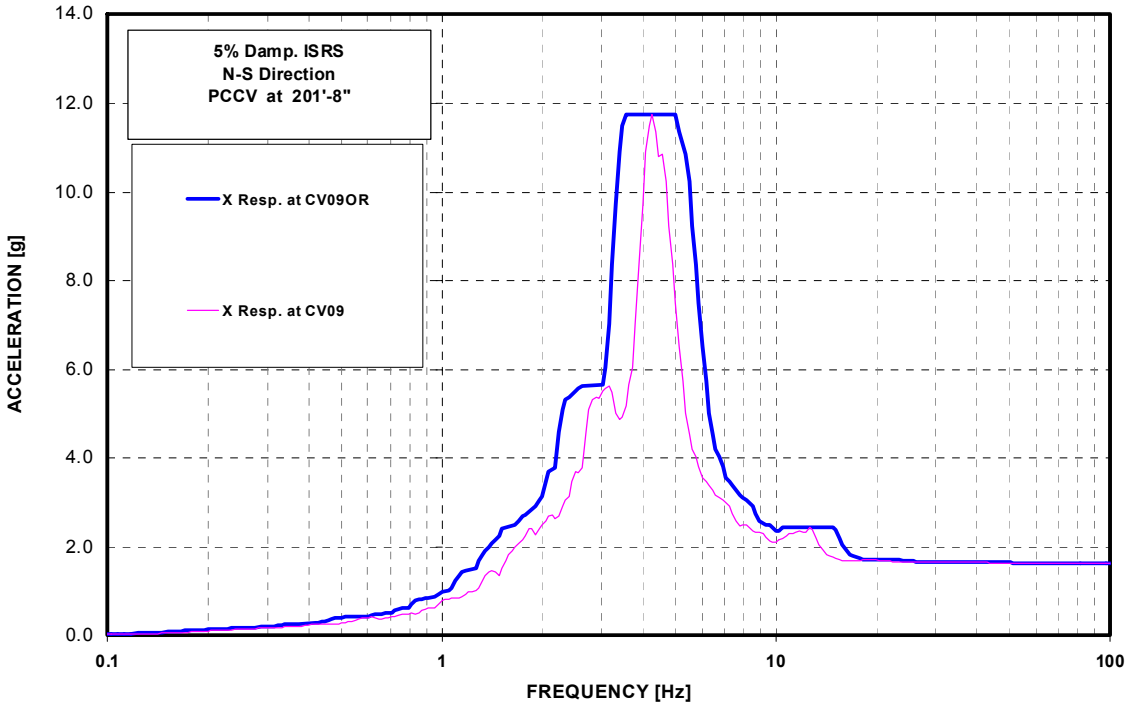


Figure 10 – CV09 ISRS N-S Direction

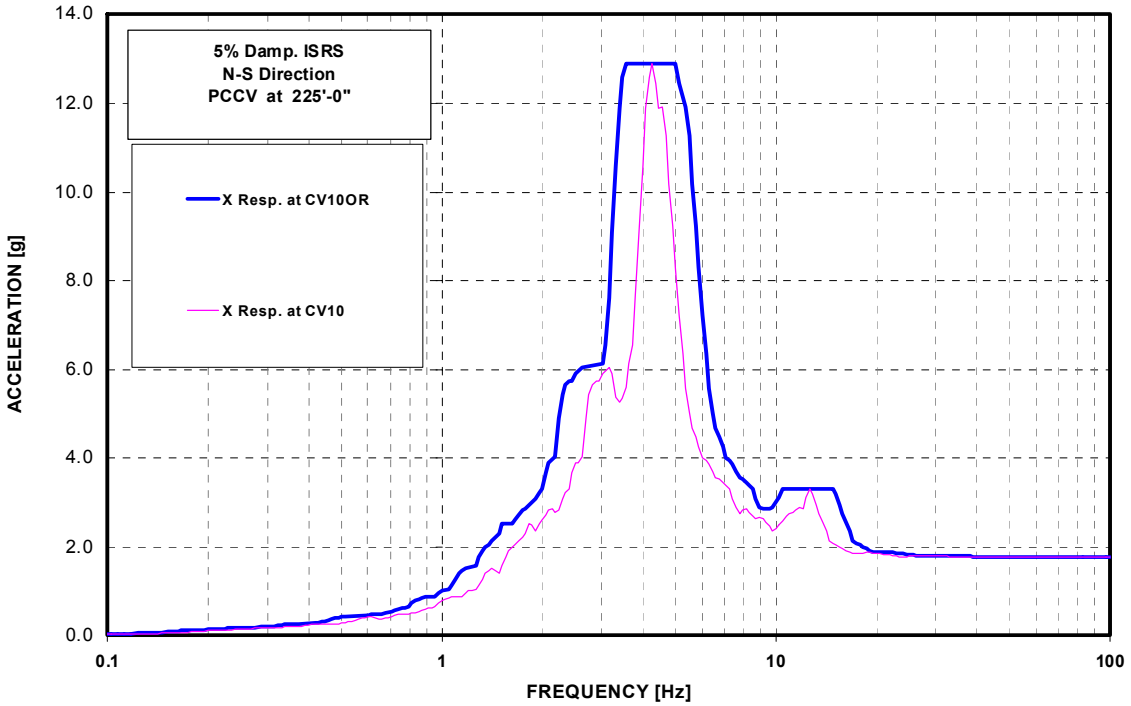


Figure 11 – CV10 ISRS N-S Direction

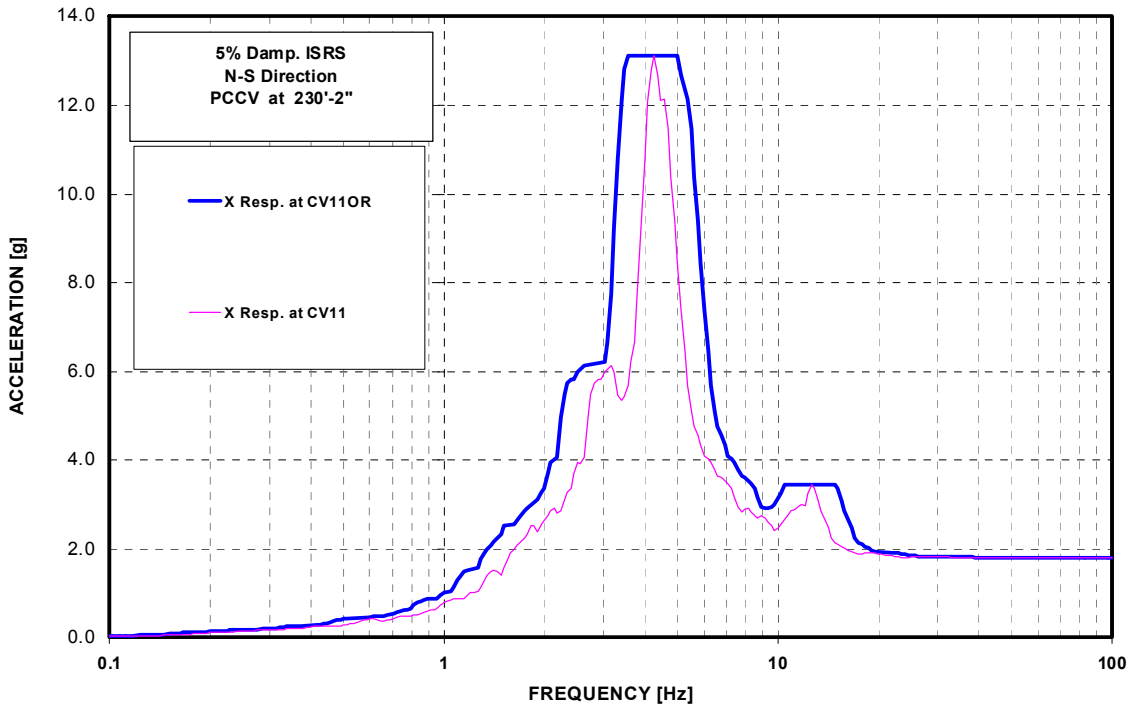


Figure 12 – CV11 ISRS N-S Direction

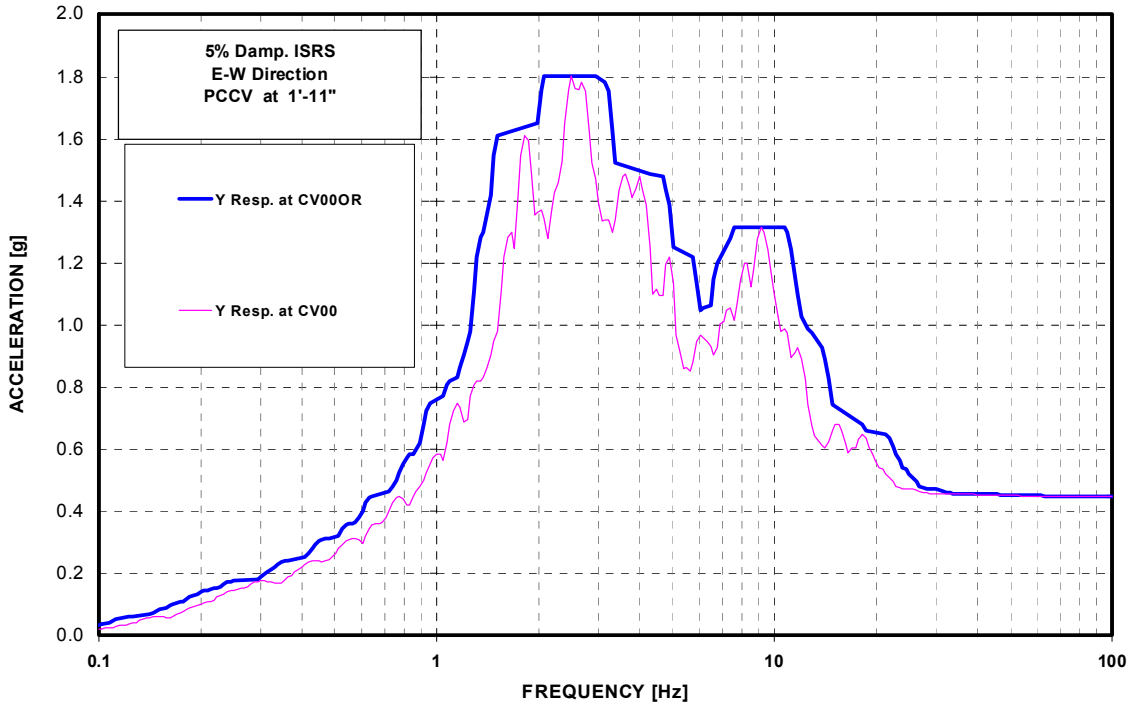


Figure 13 – CV00 ISRS E-W Direction

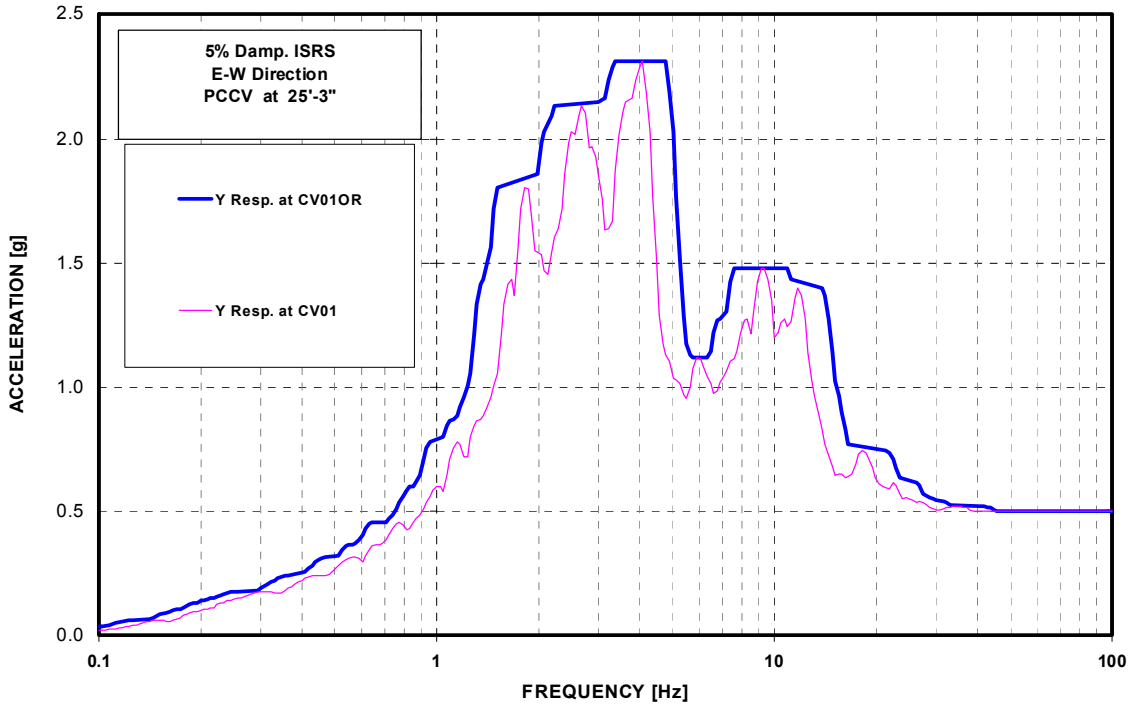


Figure 14 – CV01 ISRS E-W Direction

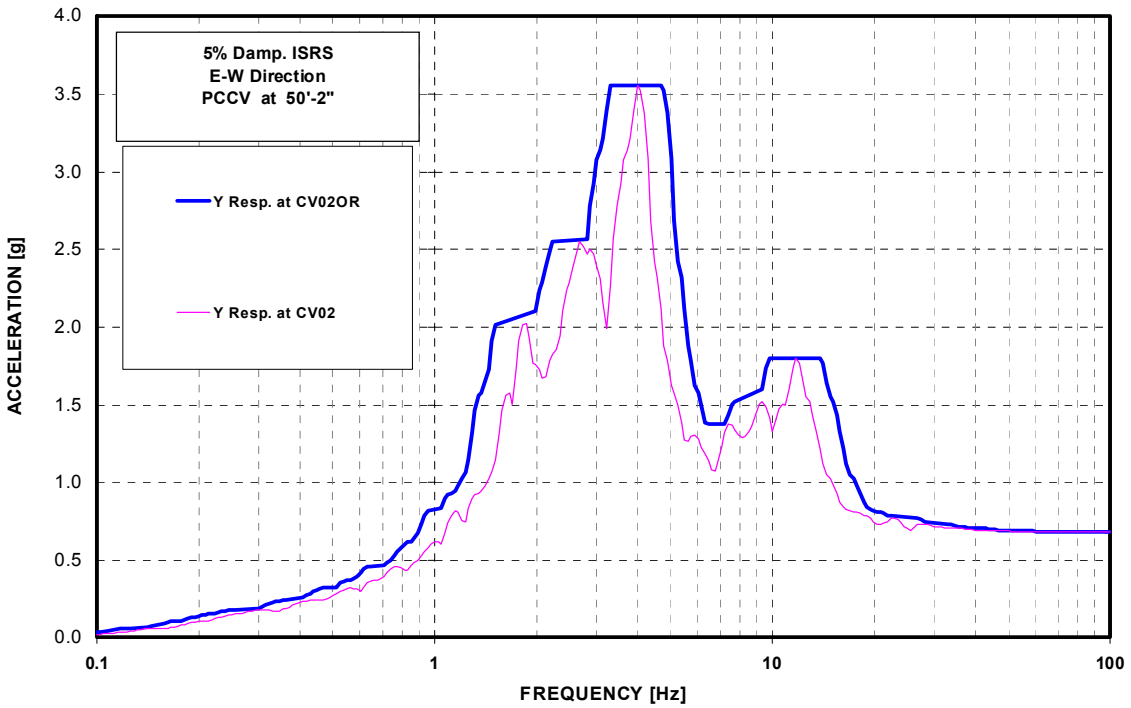


Figure 15 – CV02 ISRS E-W Direction

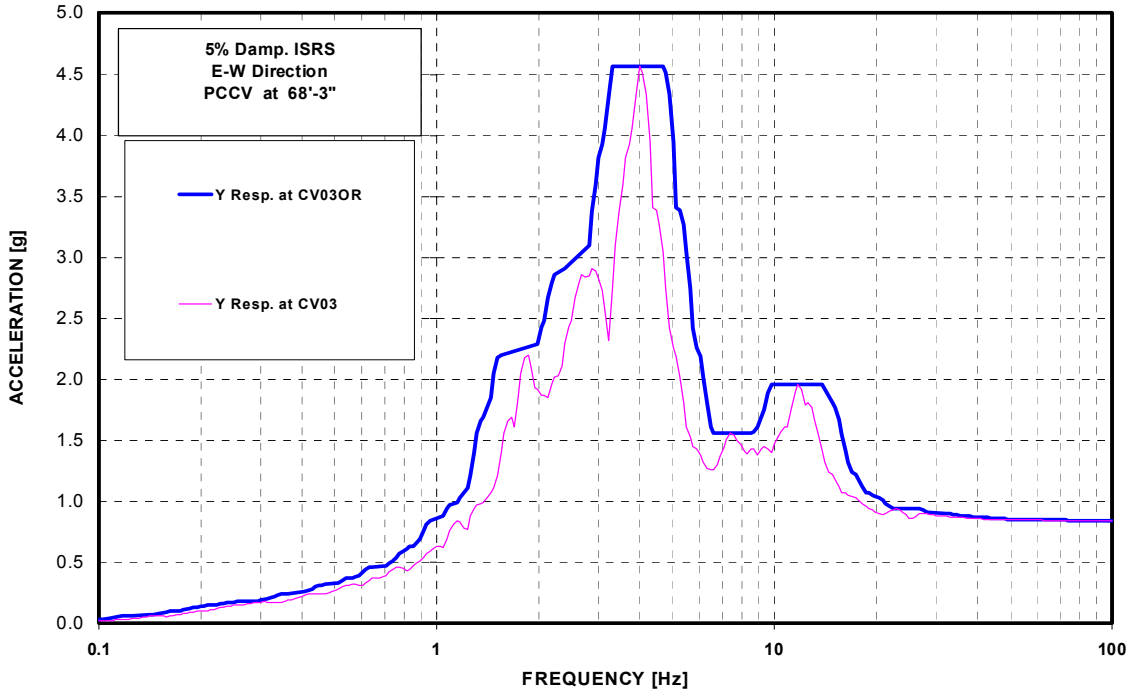


Figure 16 – CV03 ISRS E-W Direction

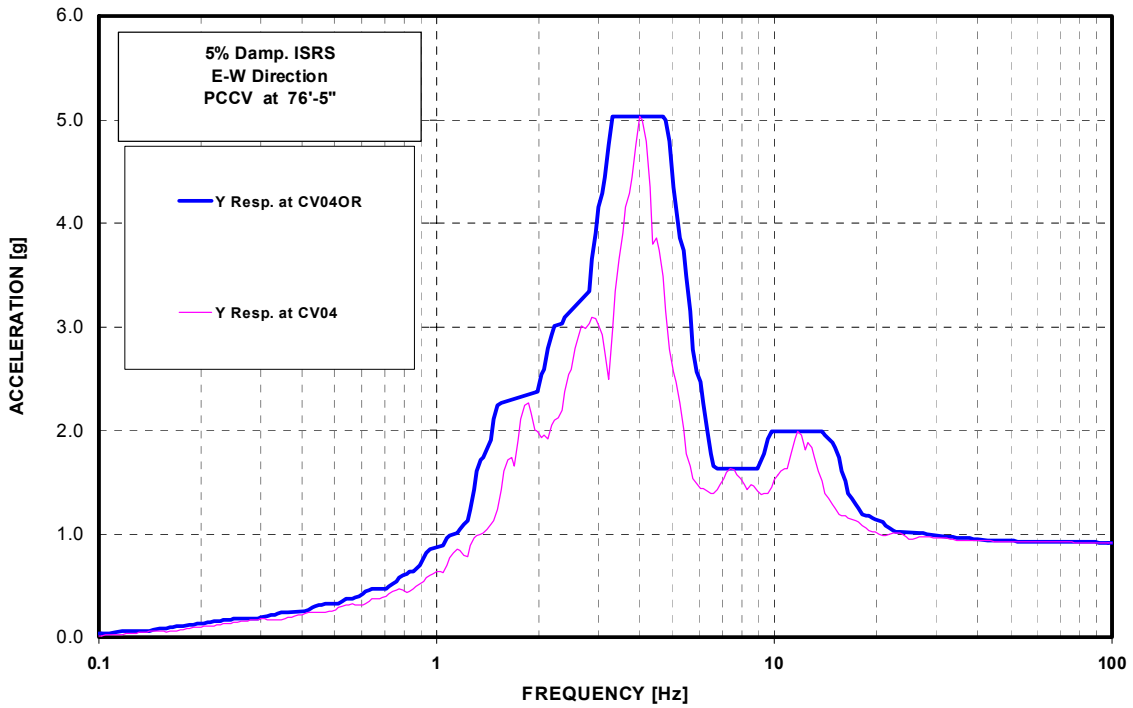


Figure 17 – CV04 ISRS E-W Direction

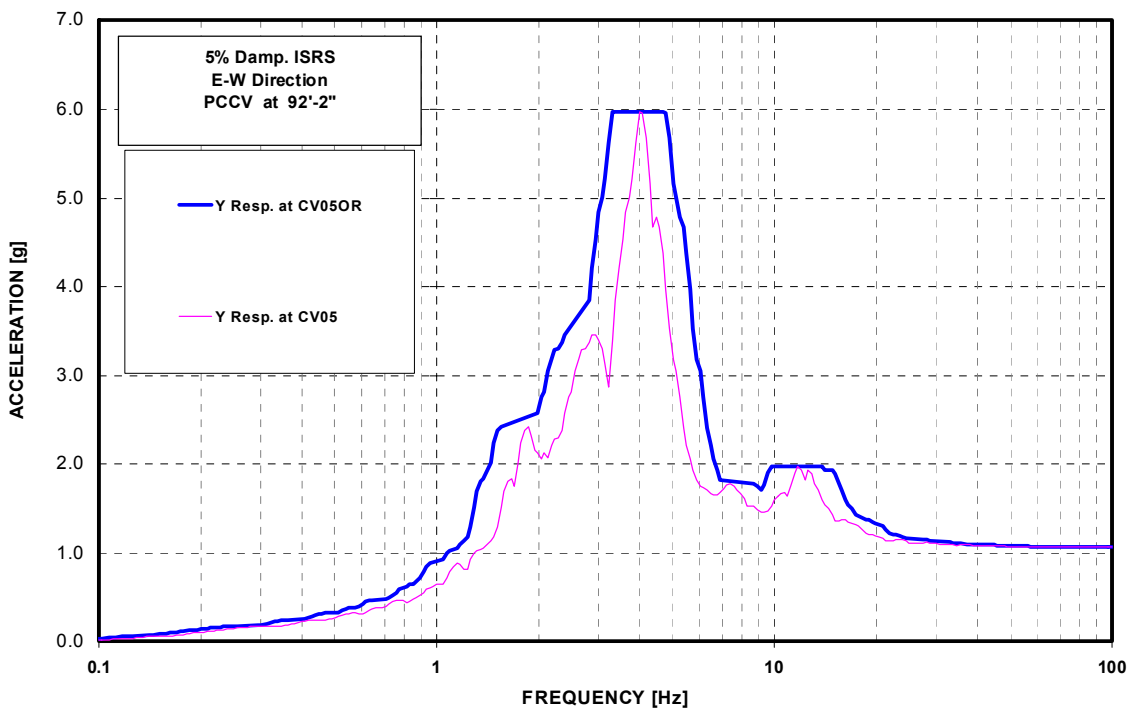


Figure 18 – CV05 ISRS E-W Direction

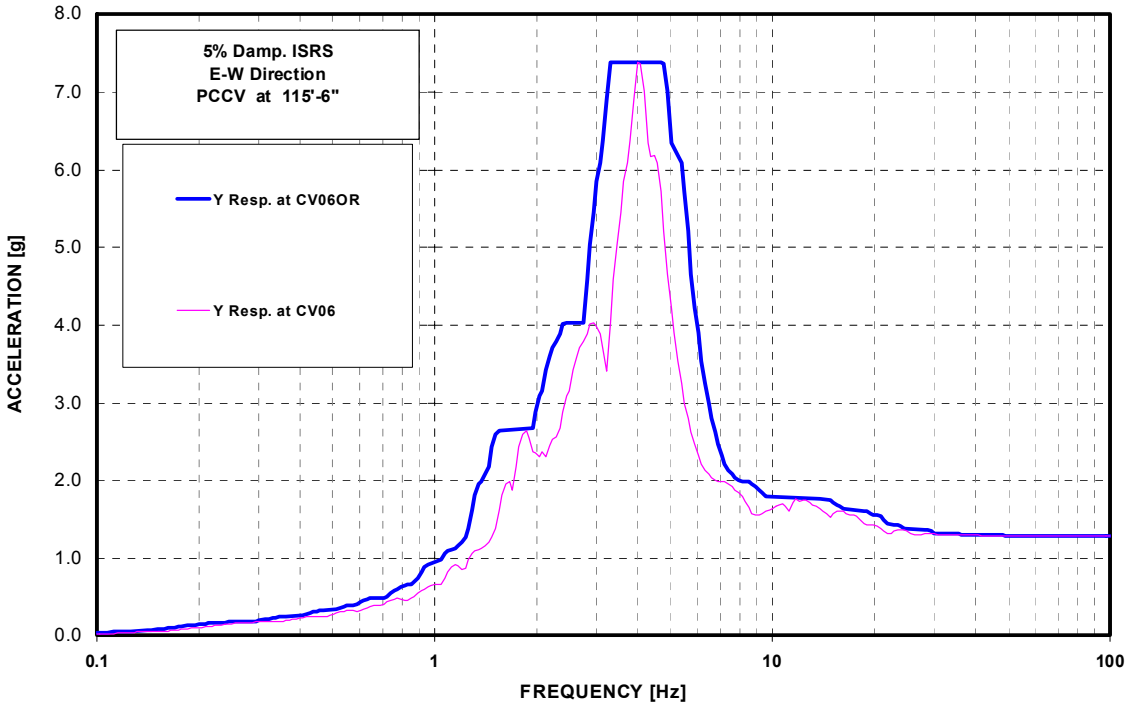


Figure 19 – CV06 ISRS E-W Direction

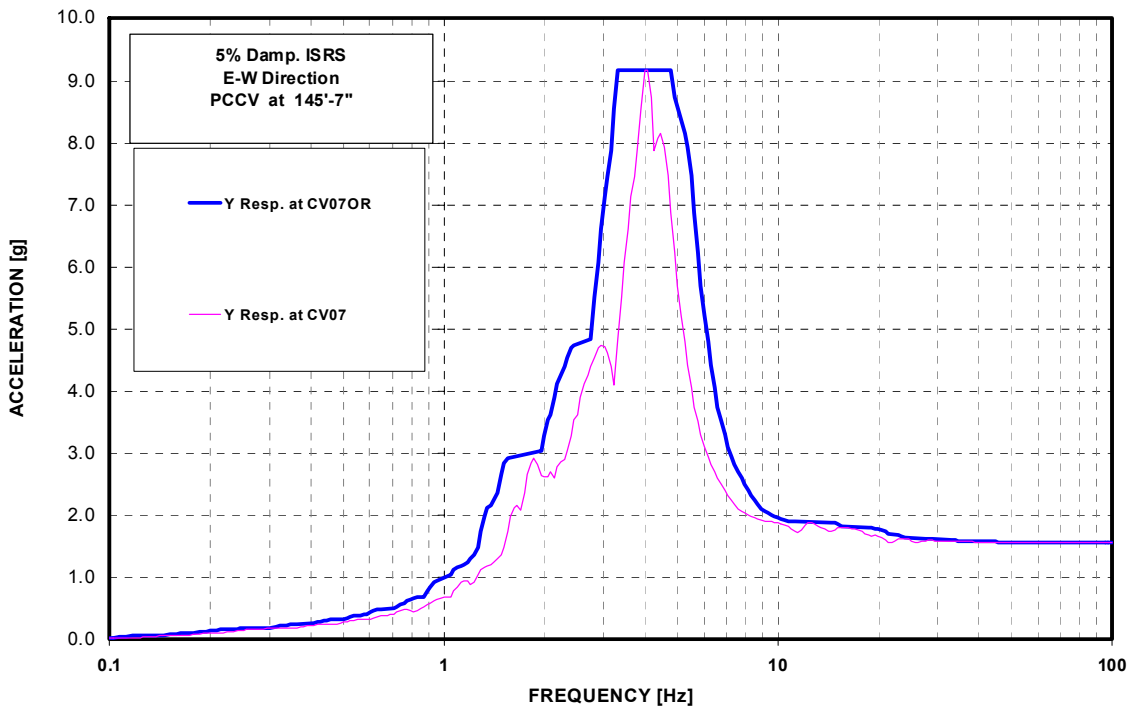


Figure 20 – CV07 ISRS E-W Direction

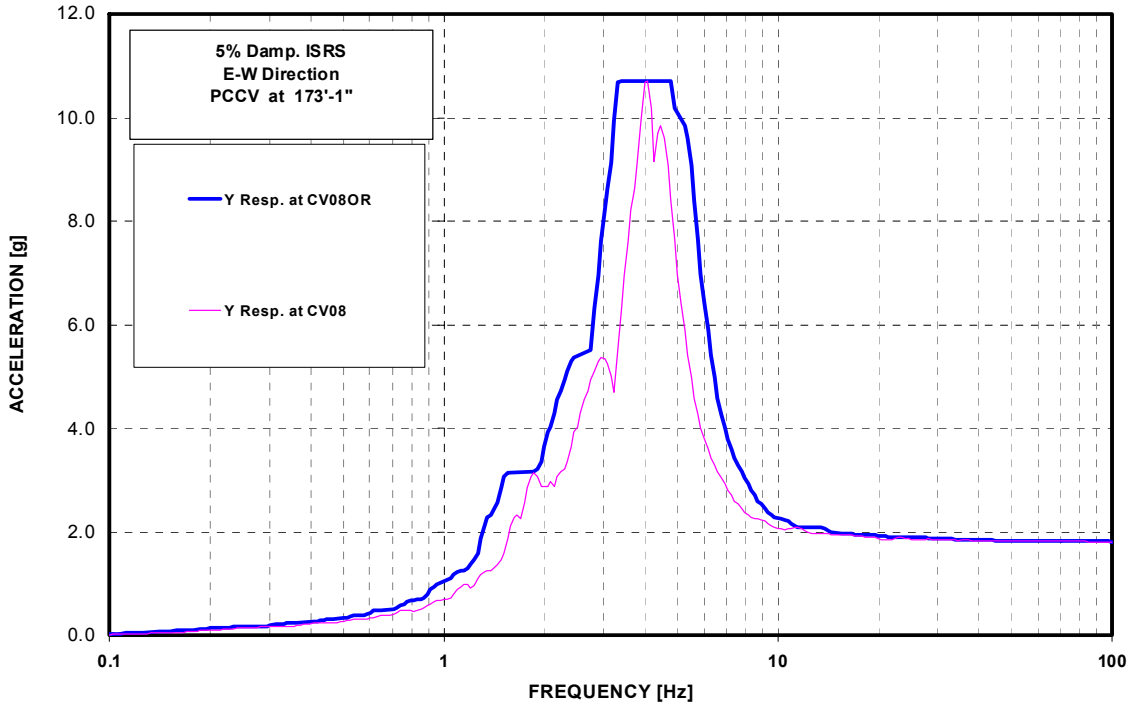


Figure 21 – CV08 ISRS E-W Direction

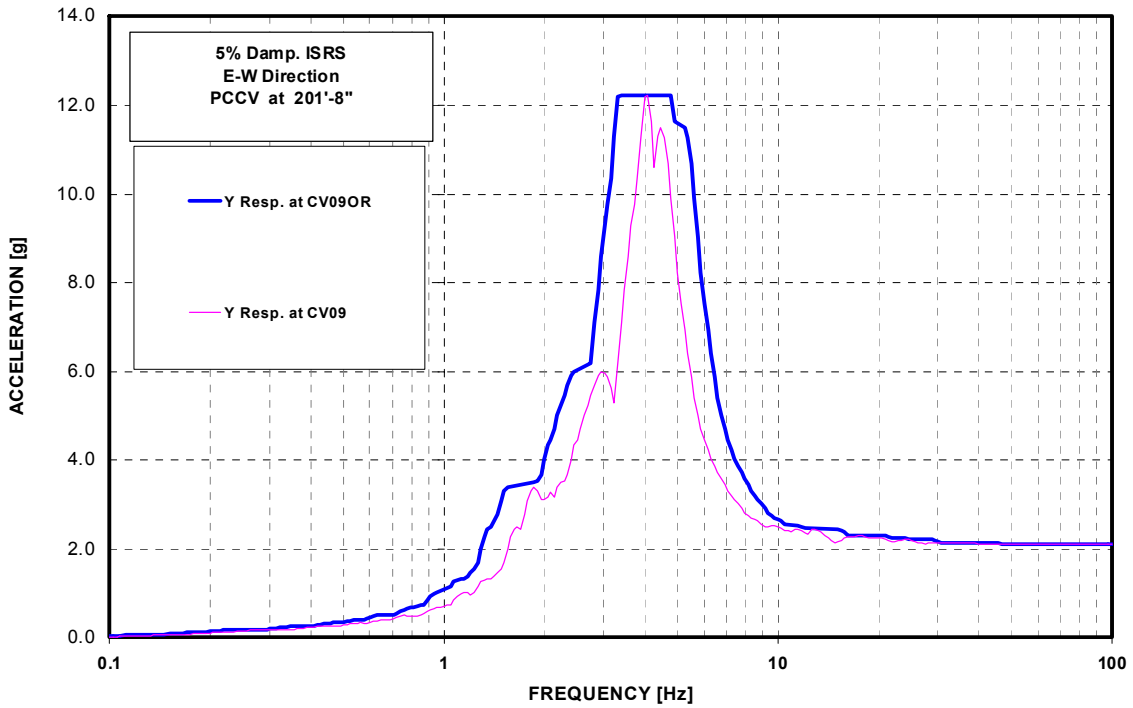


Figure 22 – CV09 ISRS E-W Direction

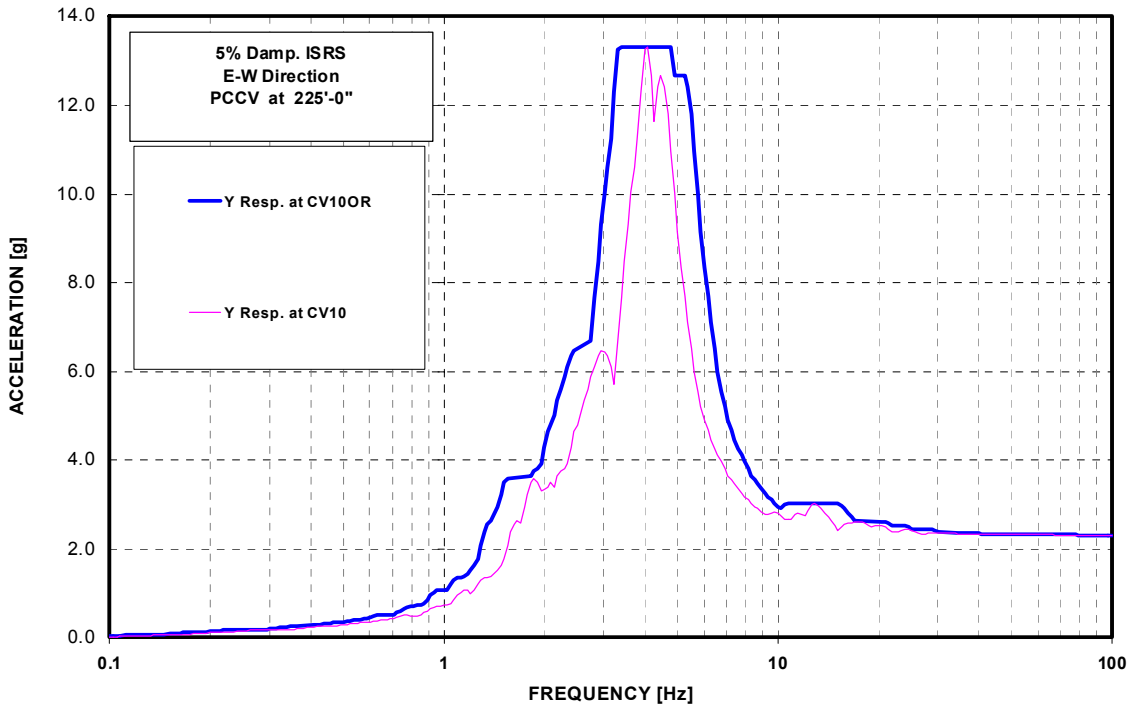


Figure 23 – CV10 ISRS E-W Direction

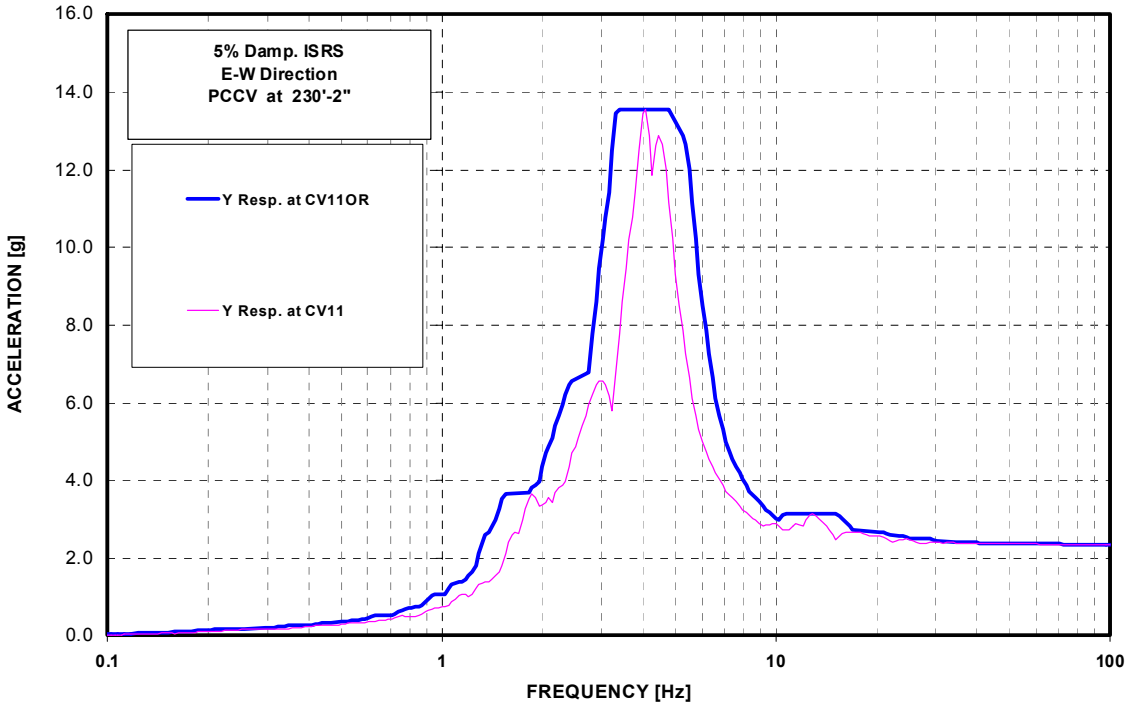


Figure 24 – CV11 ISRS E-W Direction

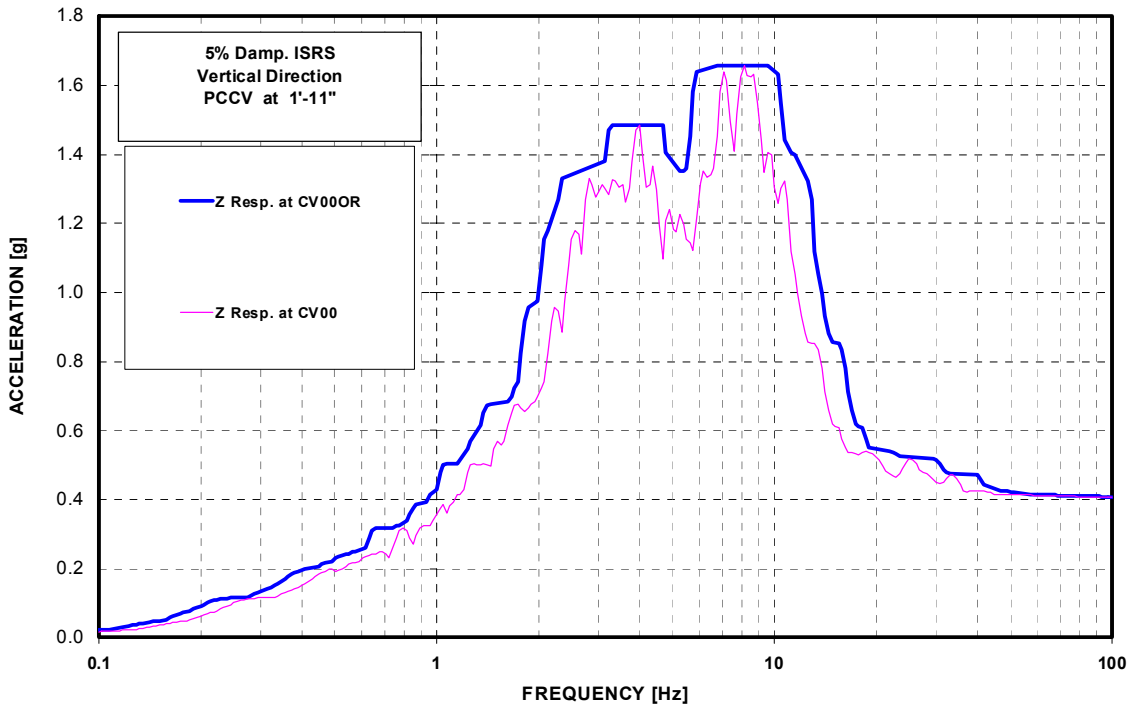


Figure 25 – CV00 ISRS Vertical Direction

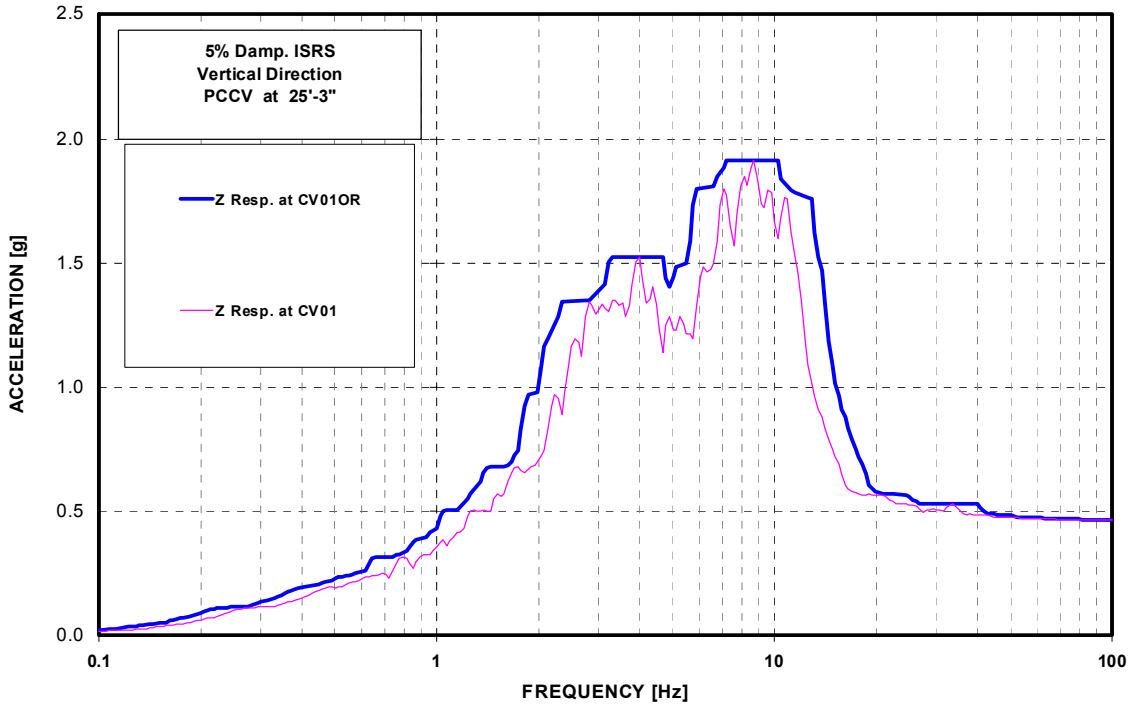


Figure 26 – CV01 ISRS Vertical Direction

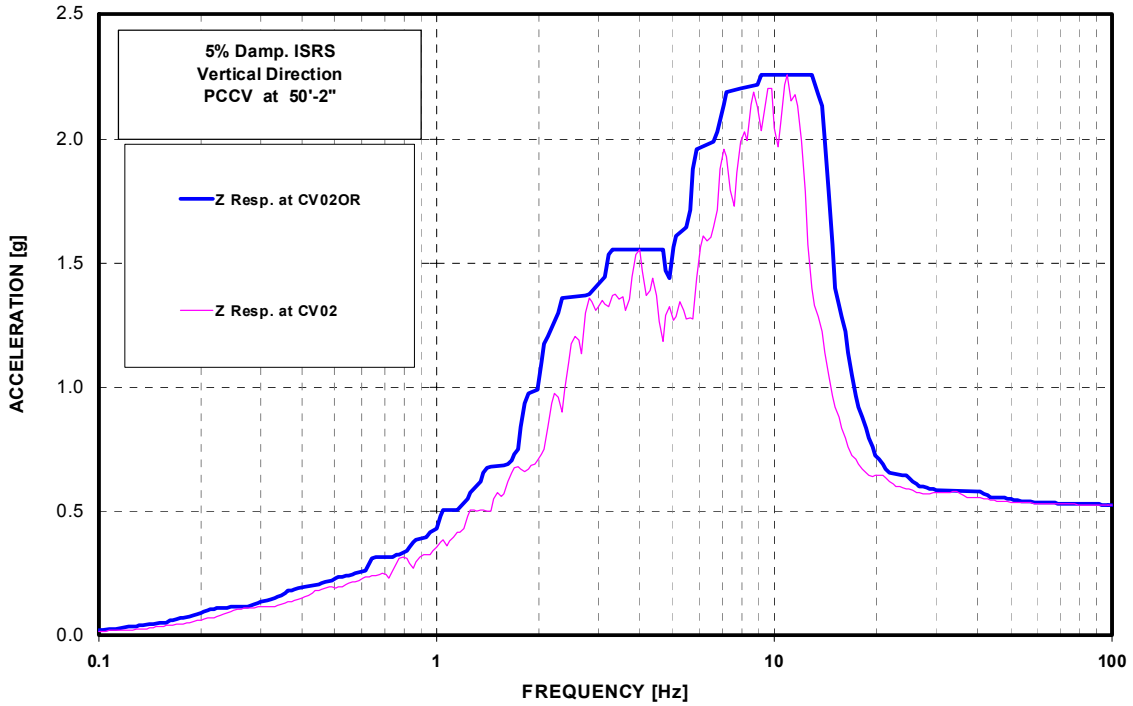


Figure 27 – CV02 ISRS Vertical Direction

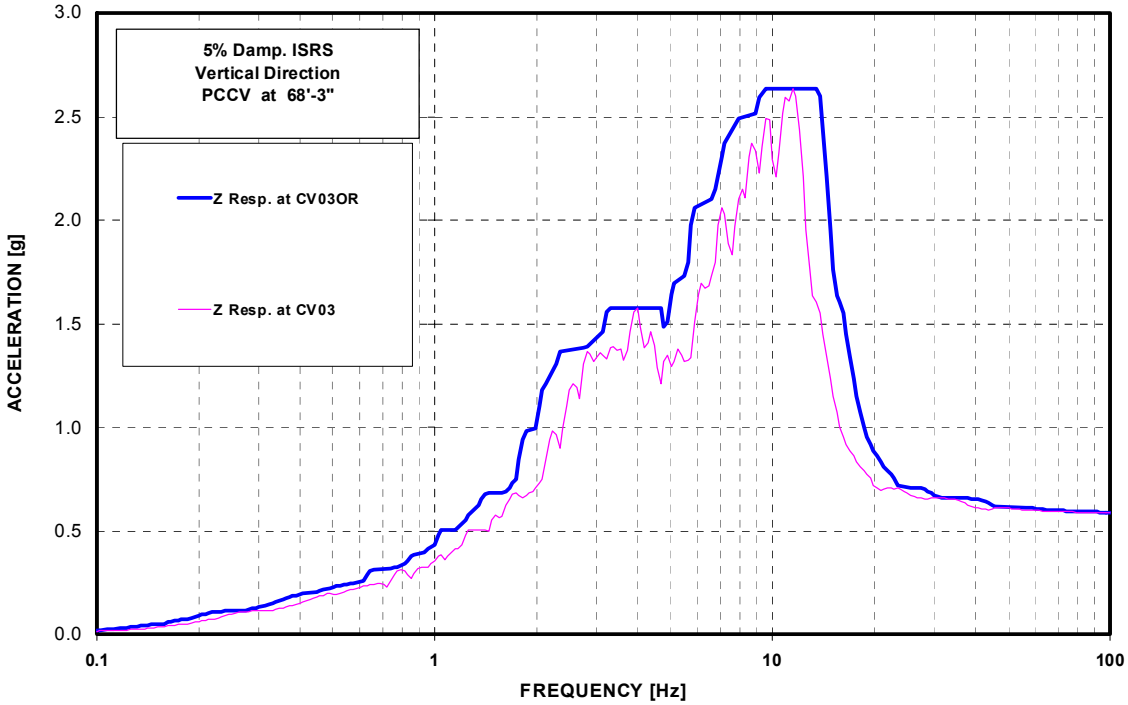


Figure 28 – CV03 ISRS Vertical Direction

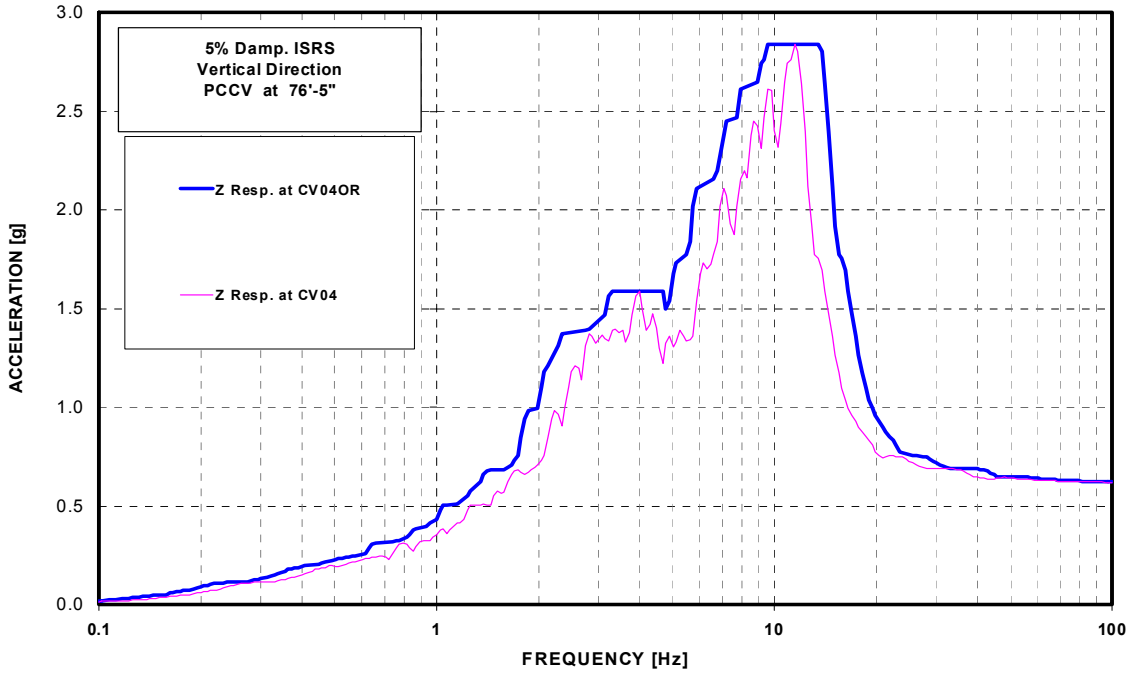


Figure 29 – CV04 ISRS Vertical Direction

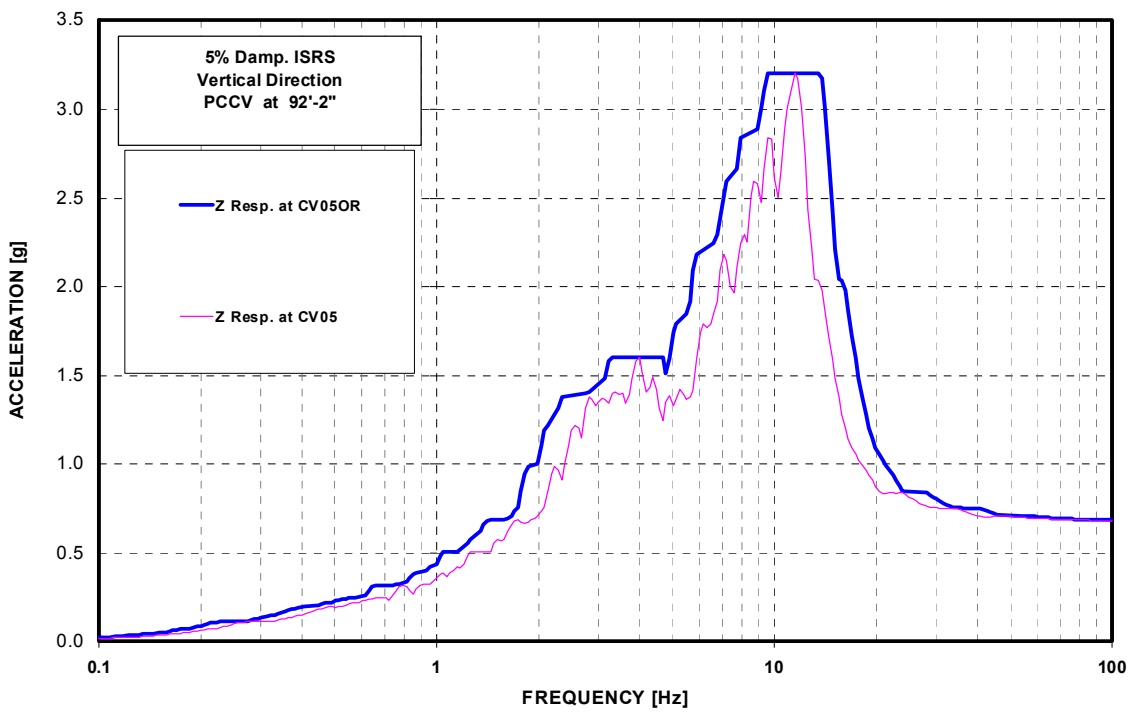


Figure 30 – CV05 ISRS Vertical Direction

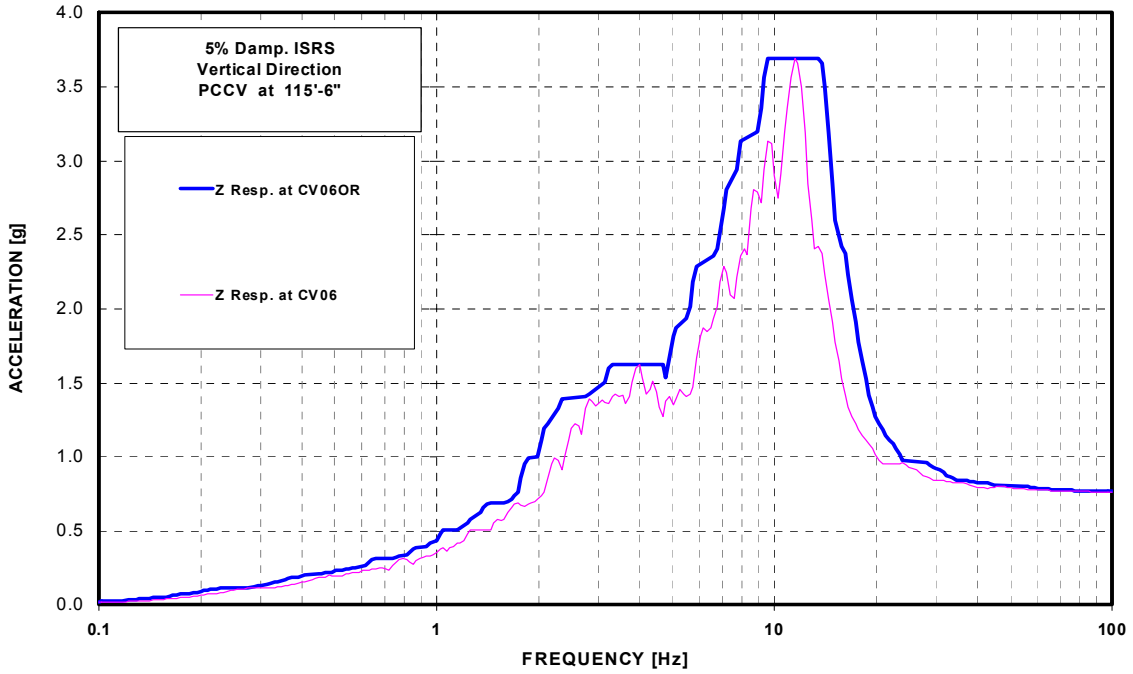


Figure 31 – CV06 ISRS Vertical Direction

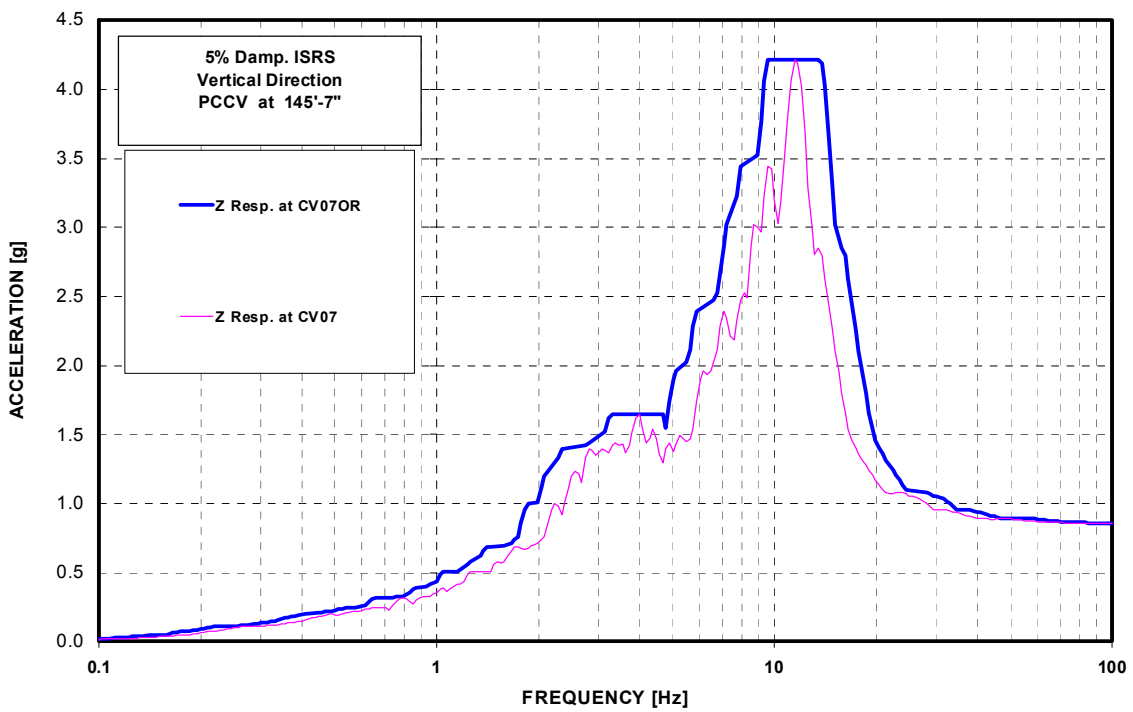


Figure 32 – CV07 ISRS Vertical Direction

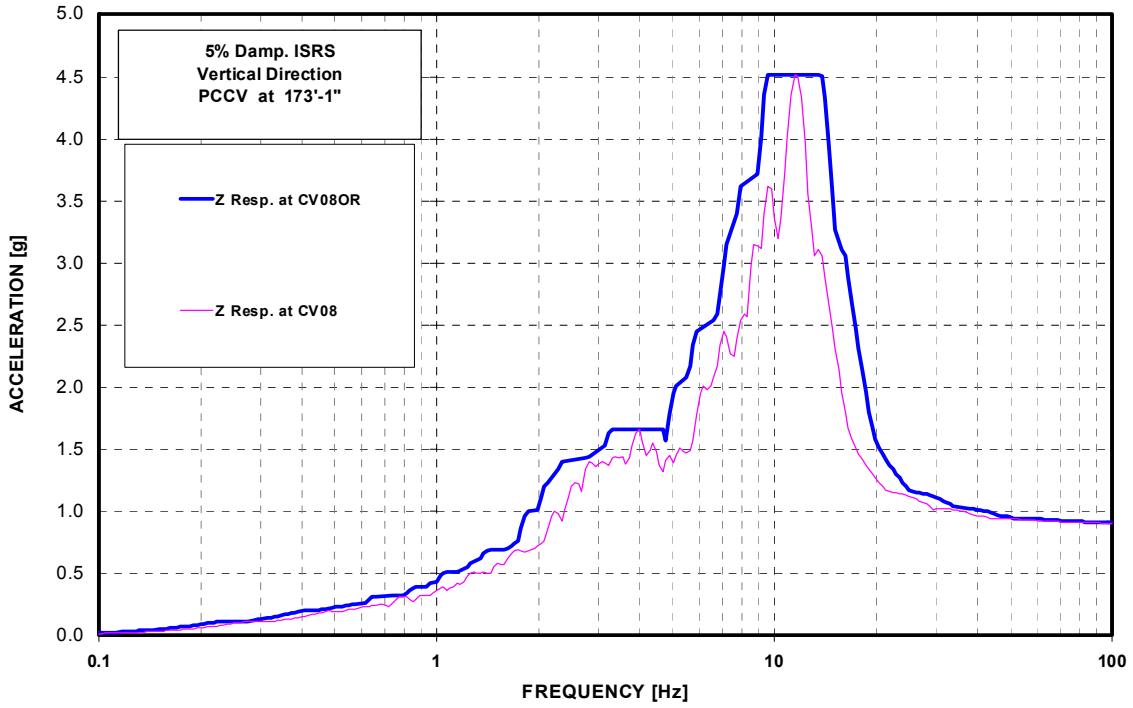


Figure 33 – CV08 ISRS Vertical Direction

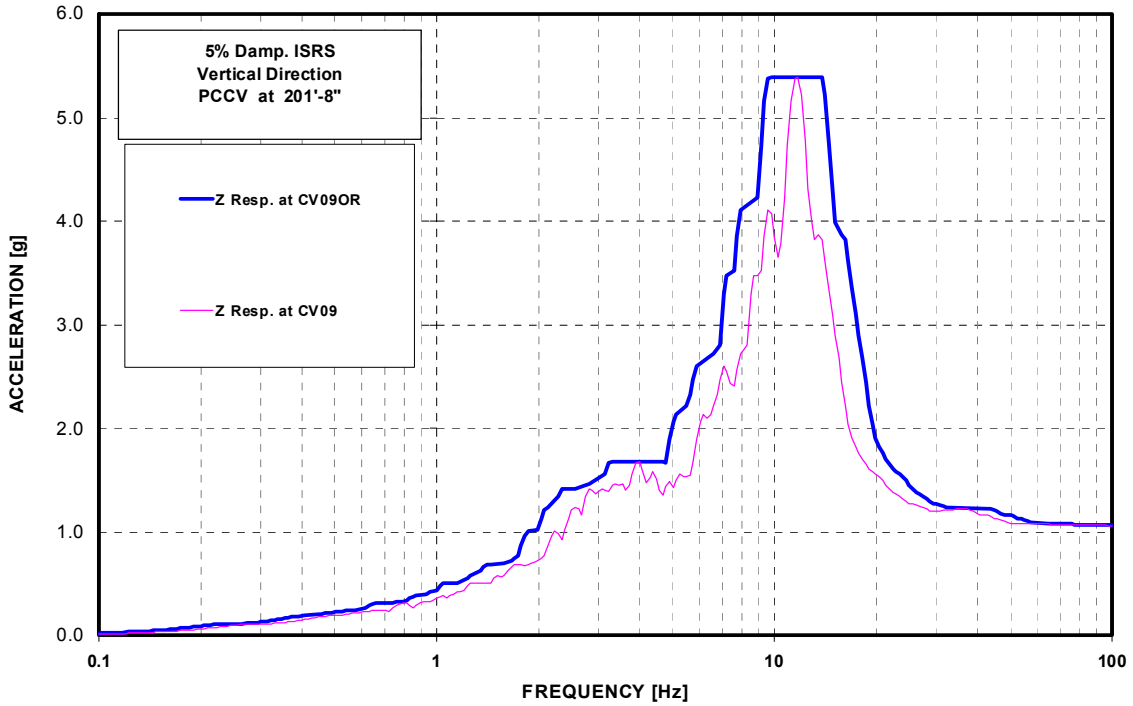


Figure 34 – CV09 ISRS Vertical Direction

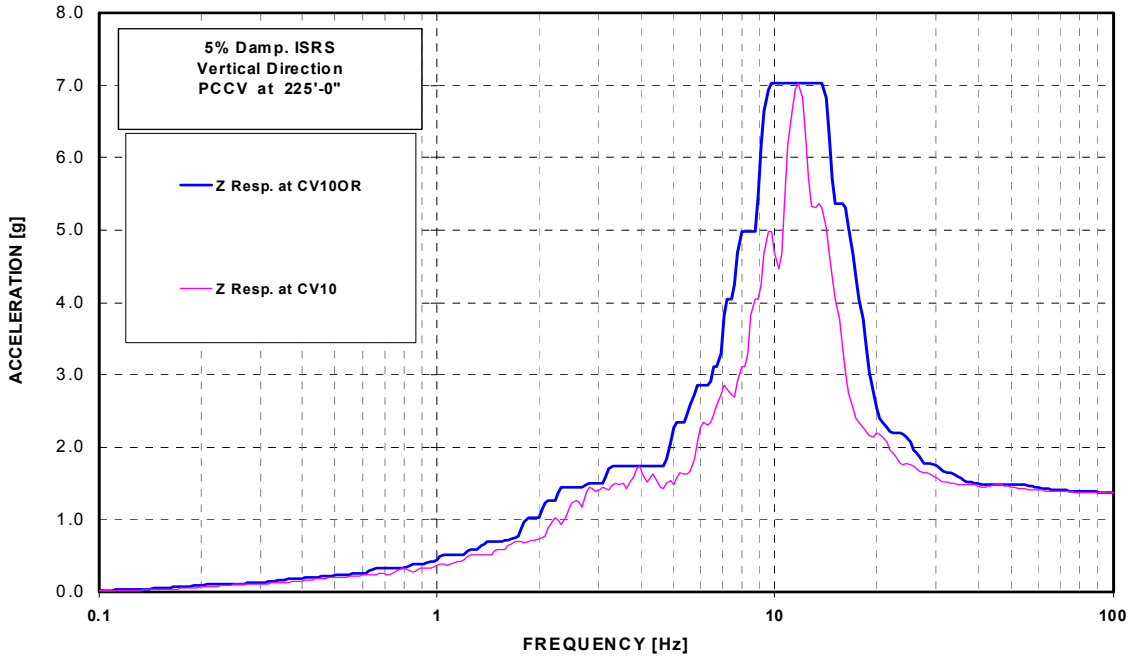
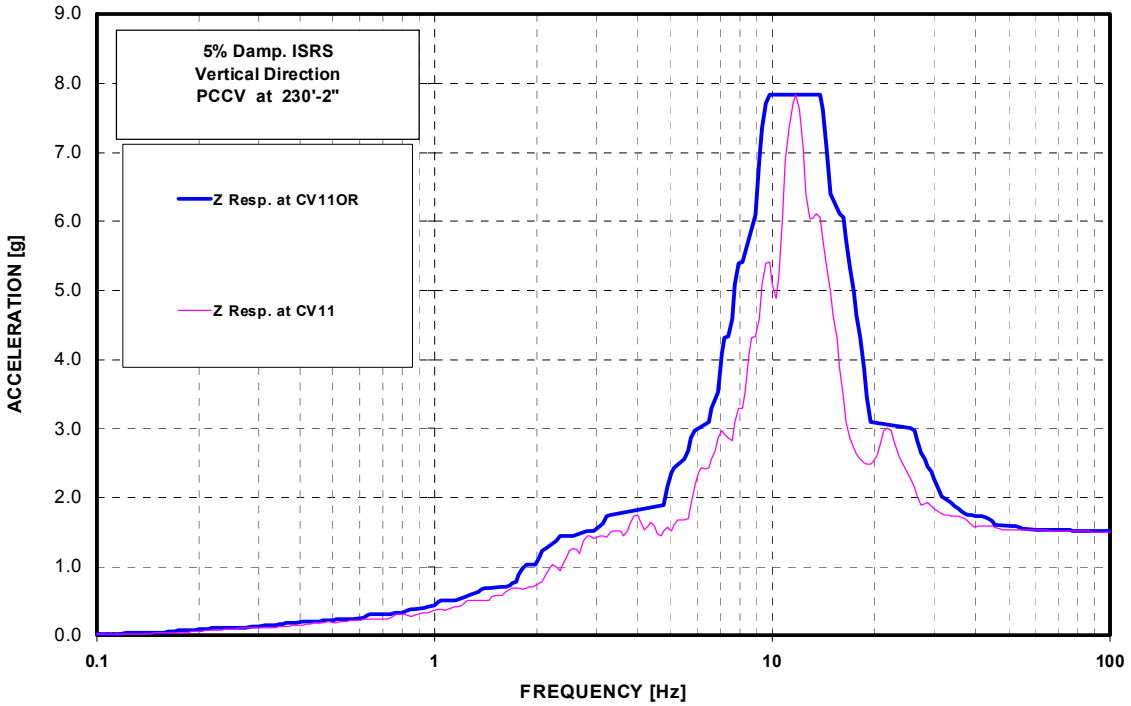


Figure 35 – CV10 ISRS Vertical Direction



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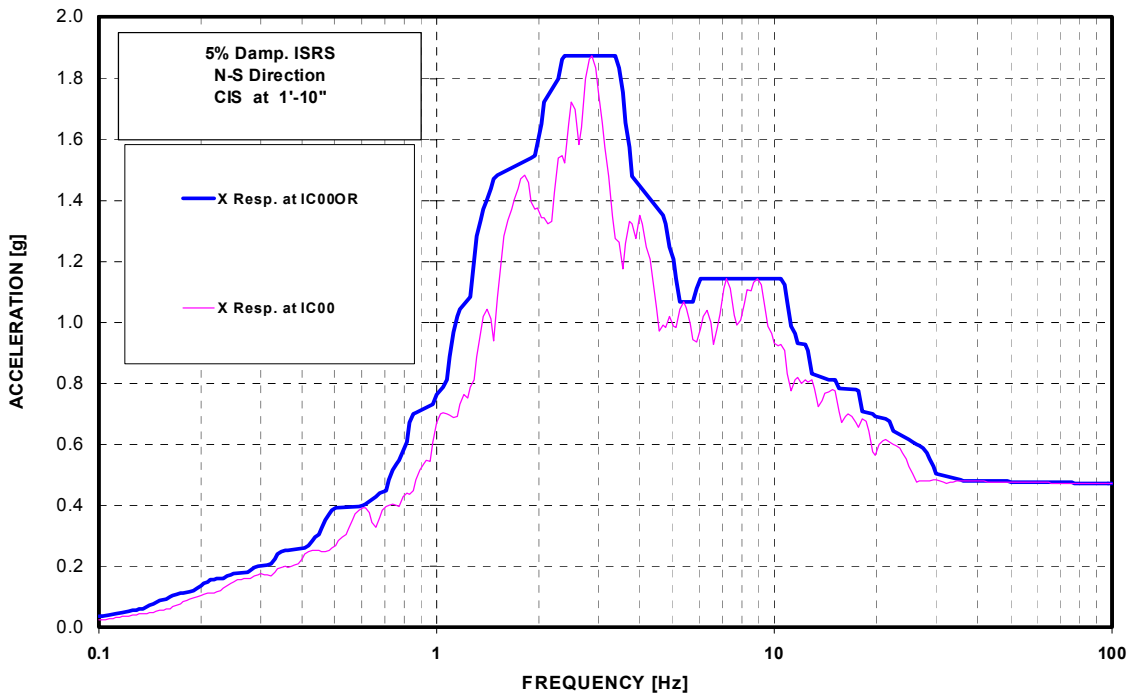


Figure 1 – IC00 ISRS N-S Direction

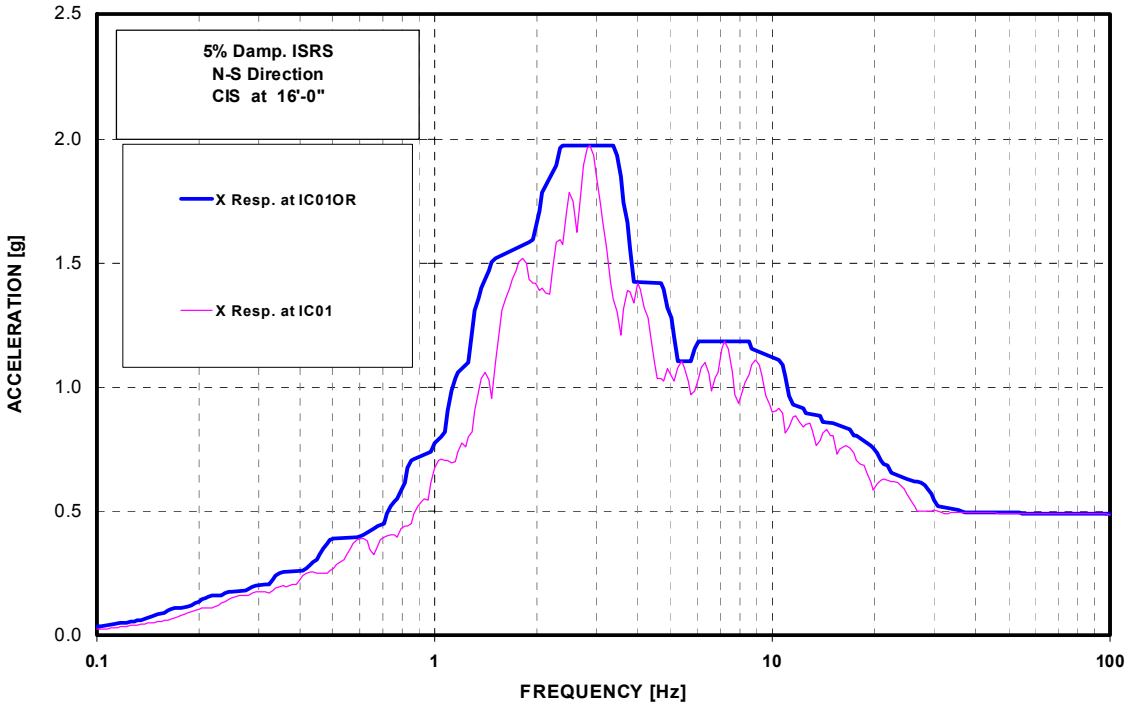


Figure 2 – IC01 ISRS N-S Direction

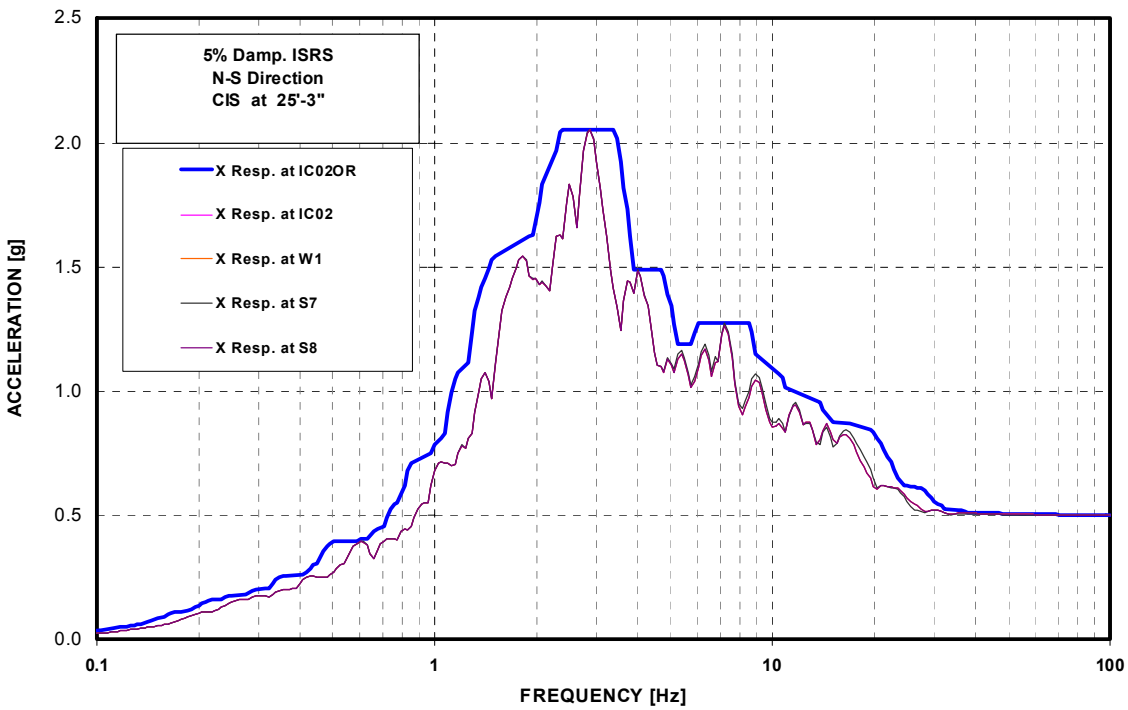
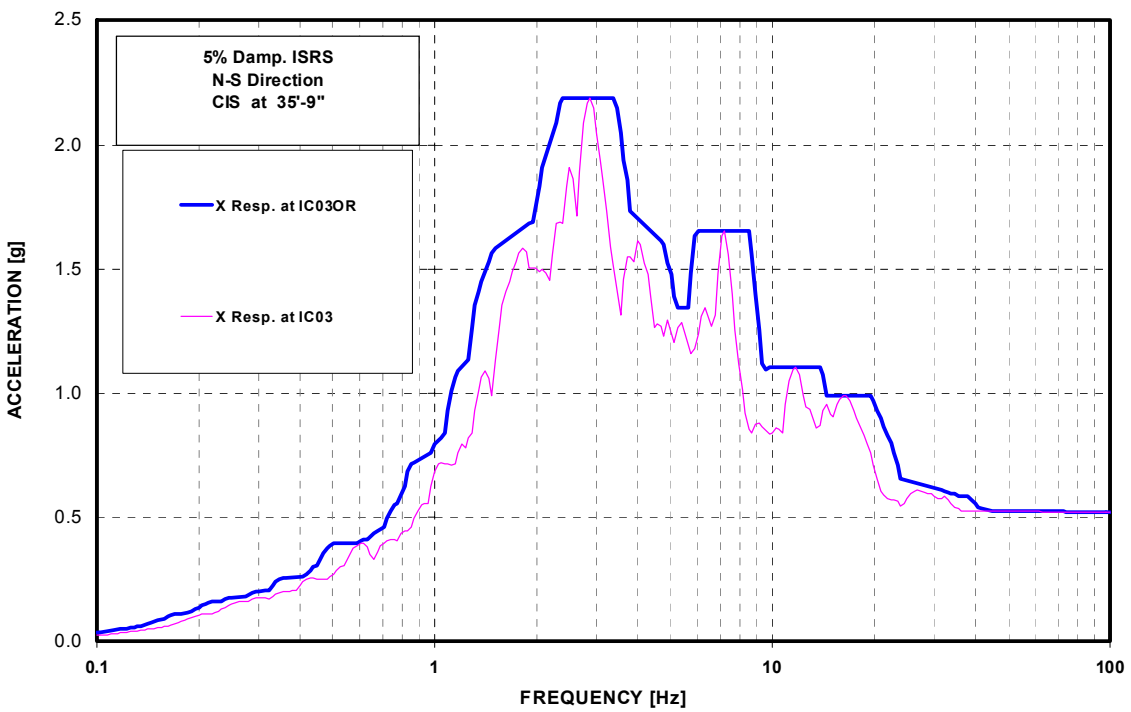


Figure 3 – IC02 ISRS N-S Direction



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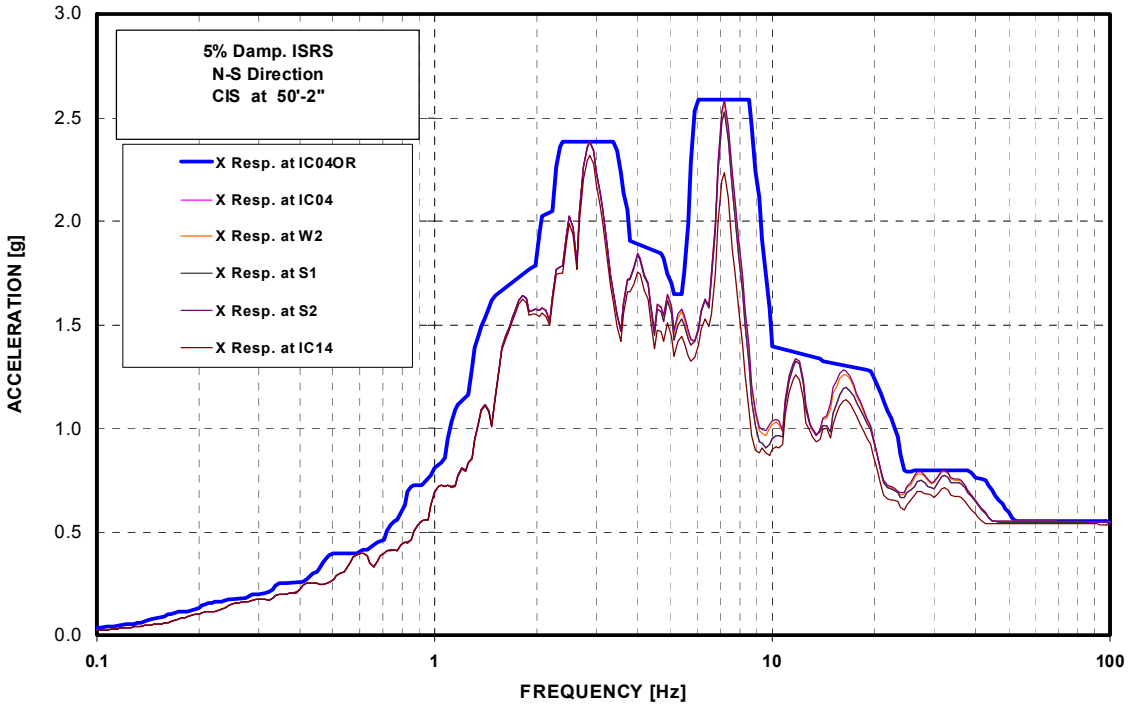

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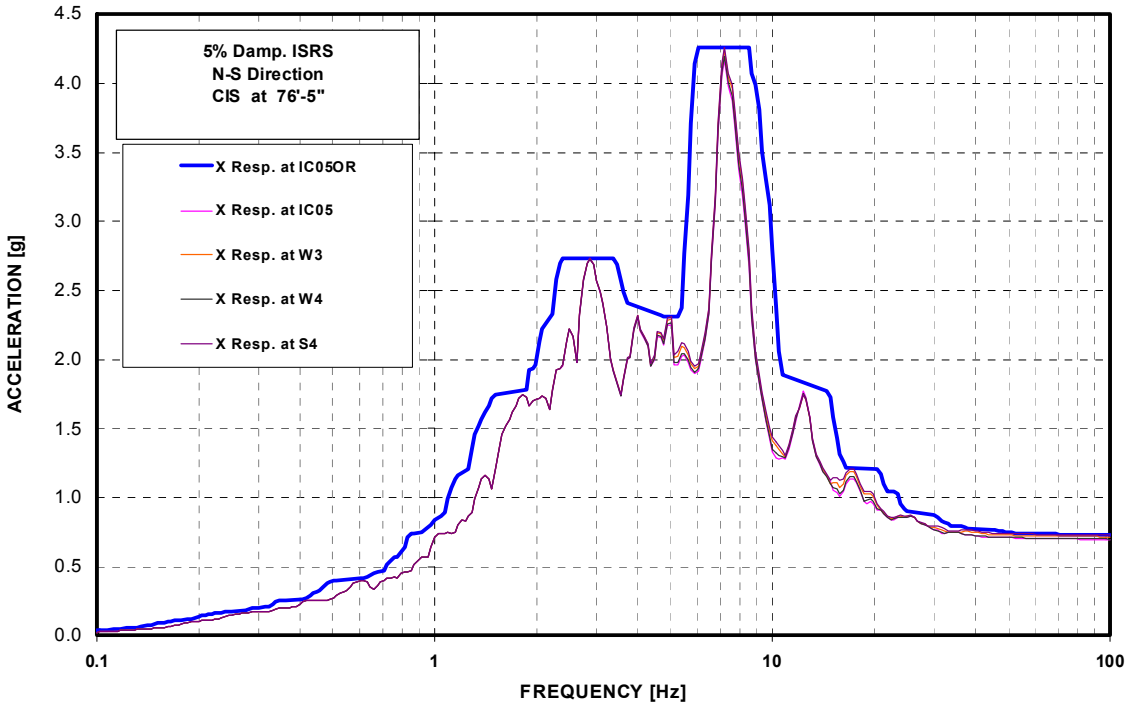

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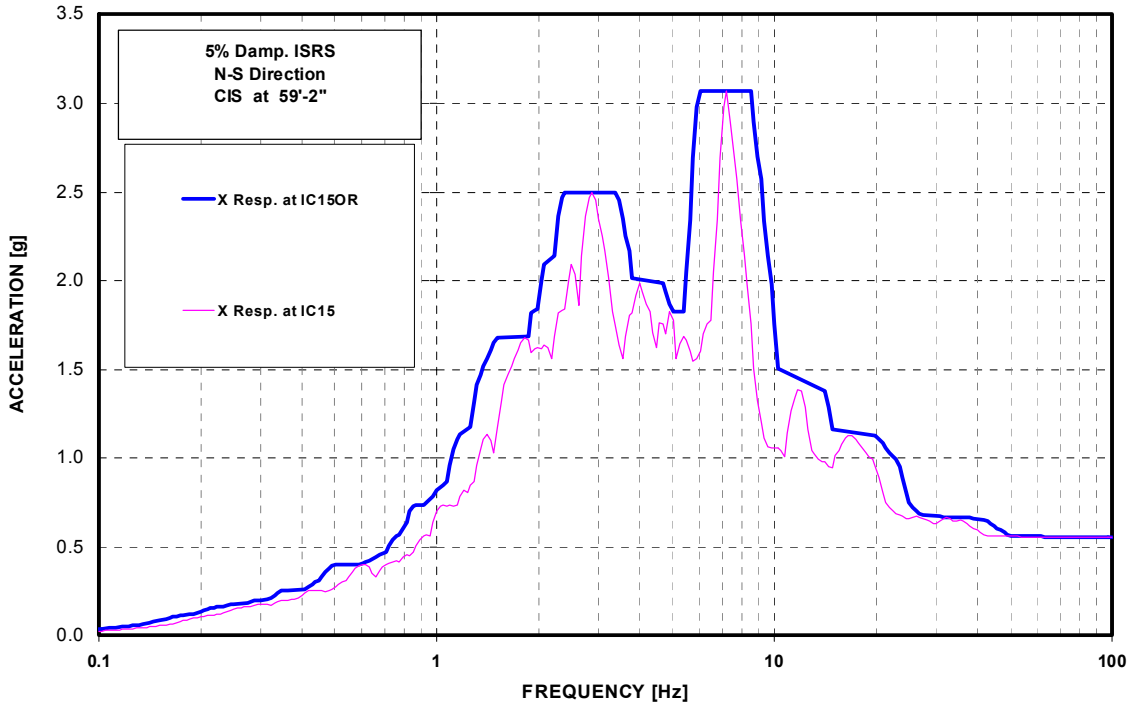

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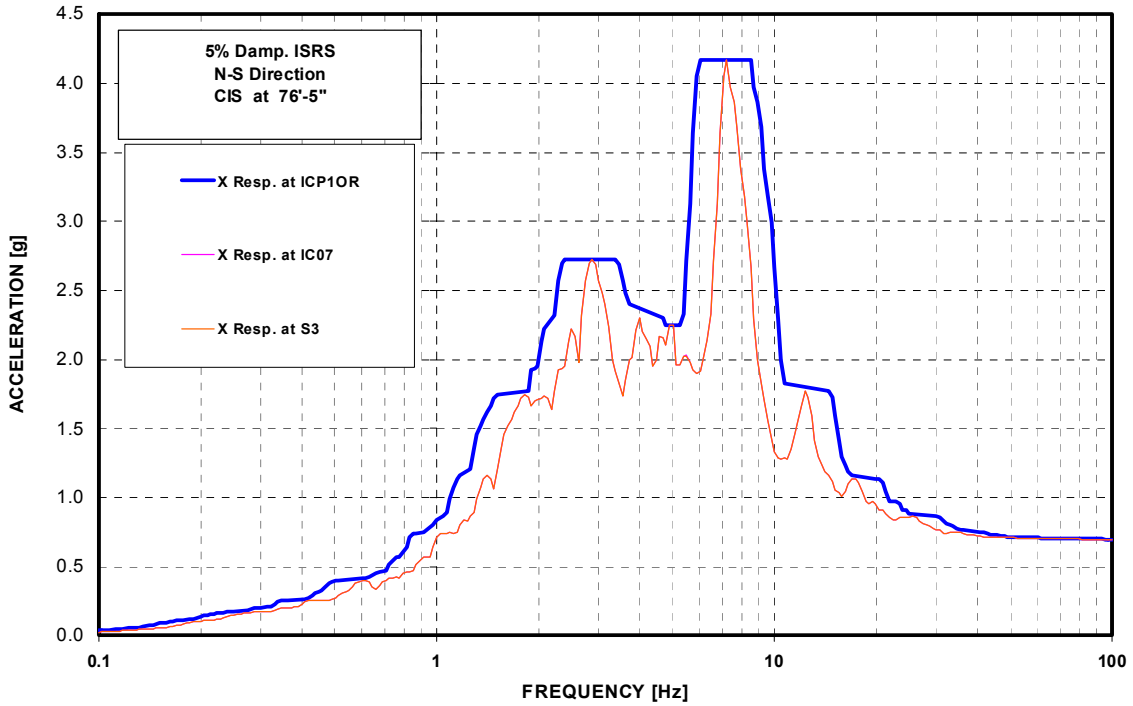

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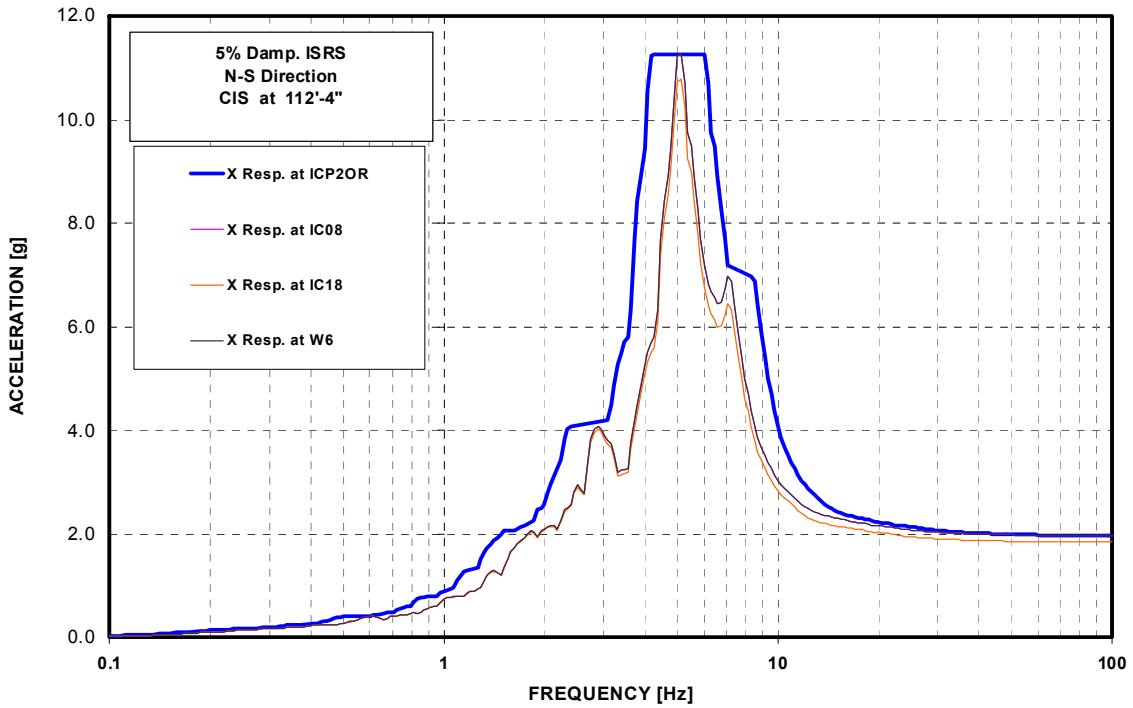

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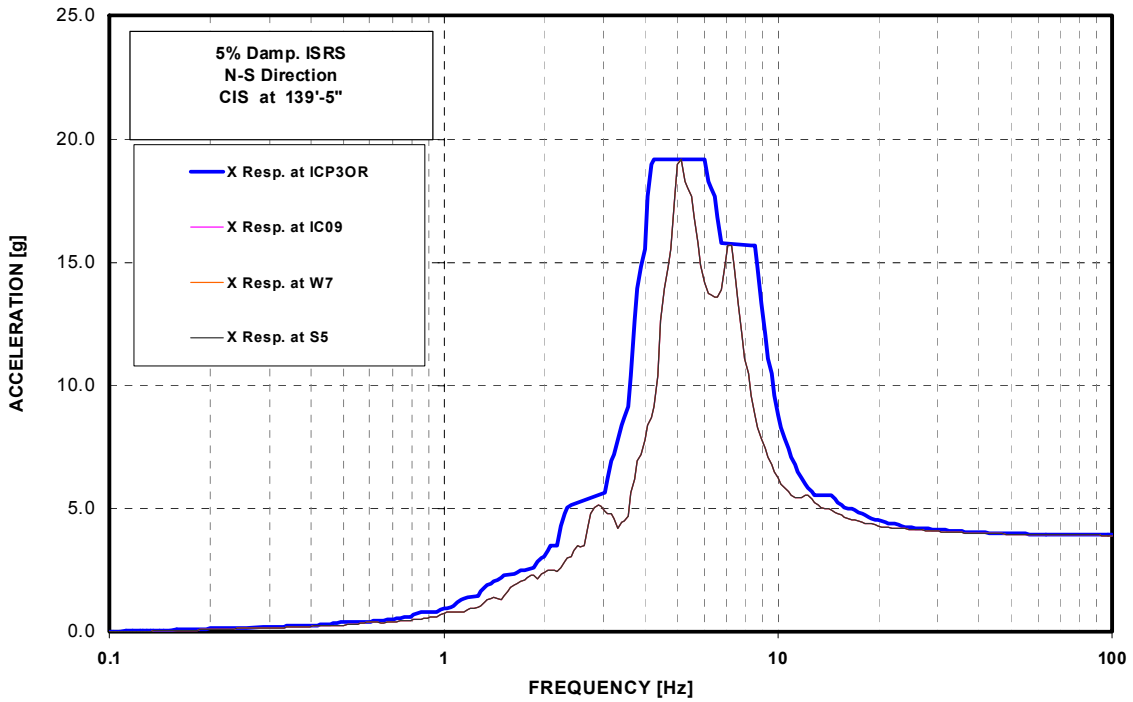


Figure 10 – ICP3 ISRS N-S Direction

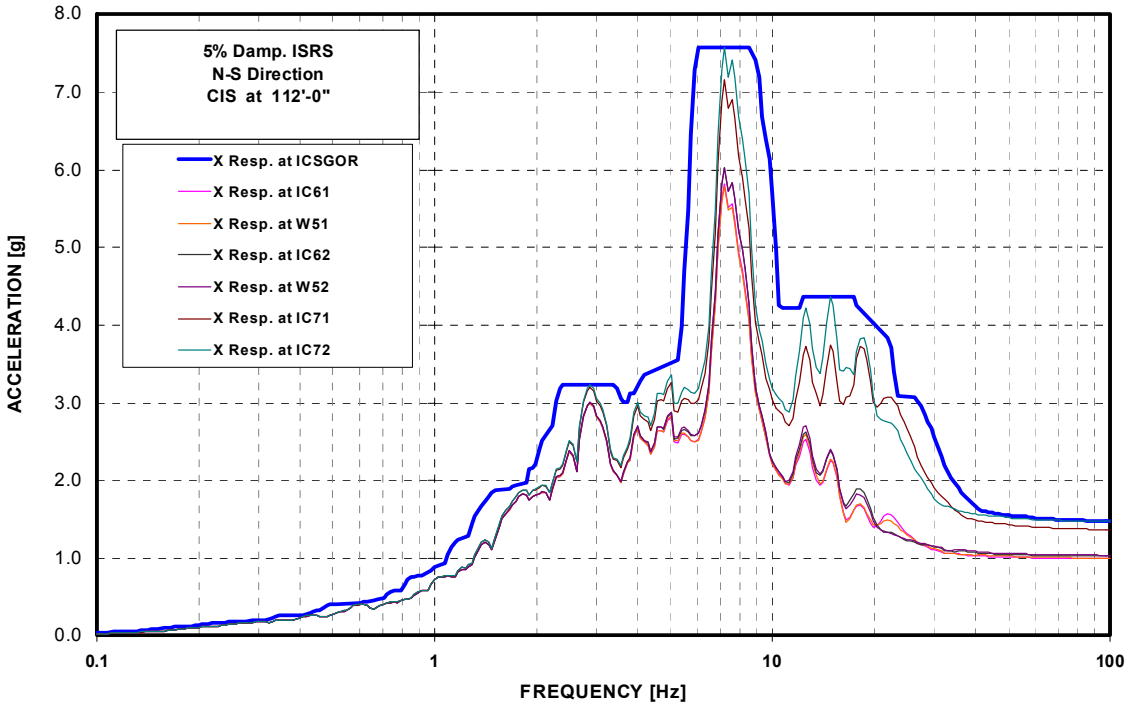
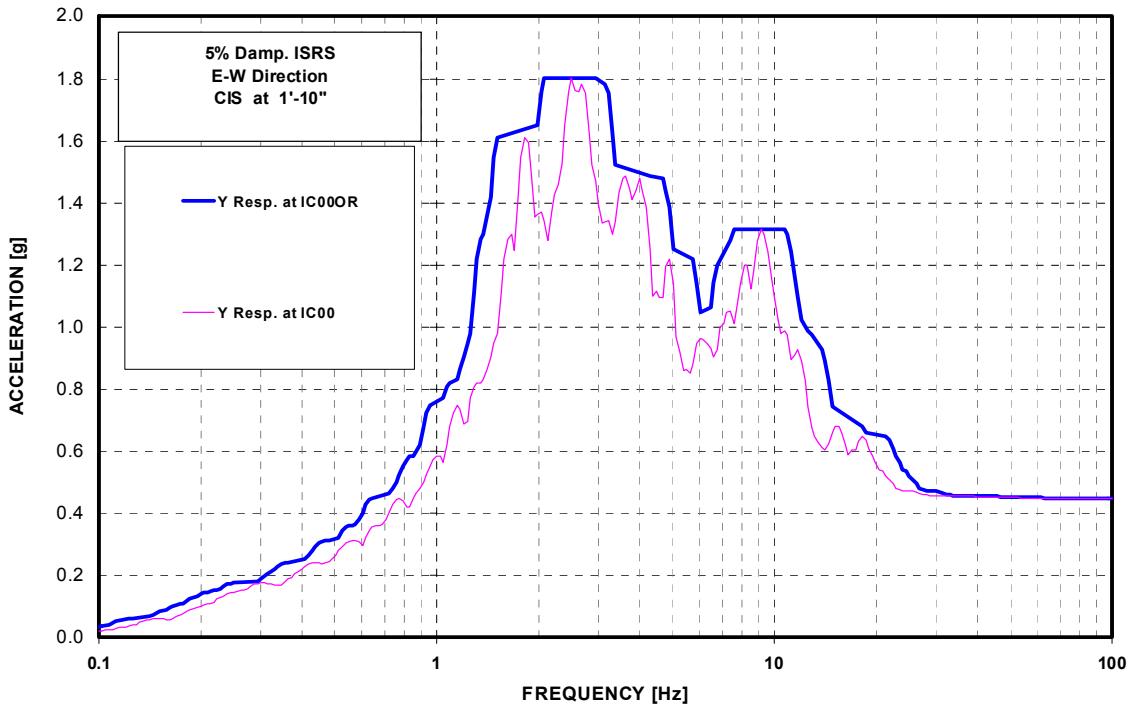


Figure 11 – ICSG ISRS N-S Direction



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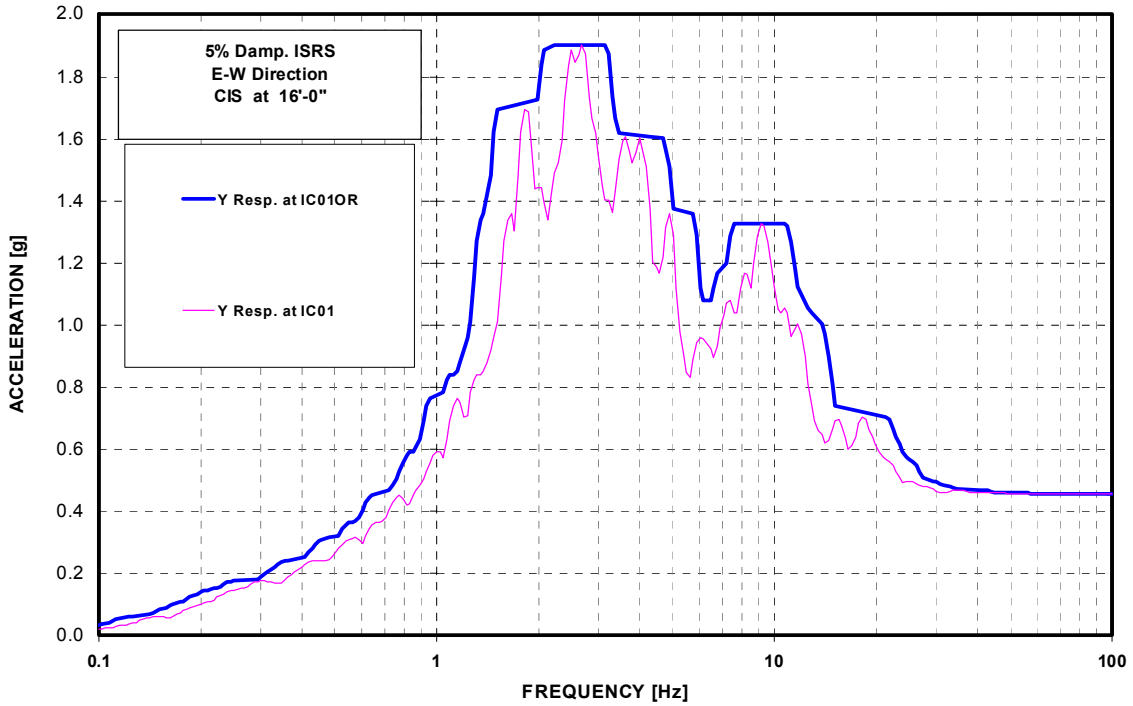

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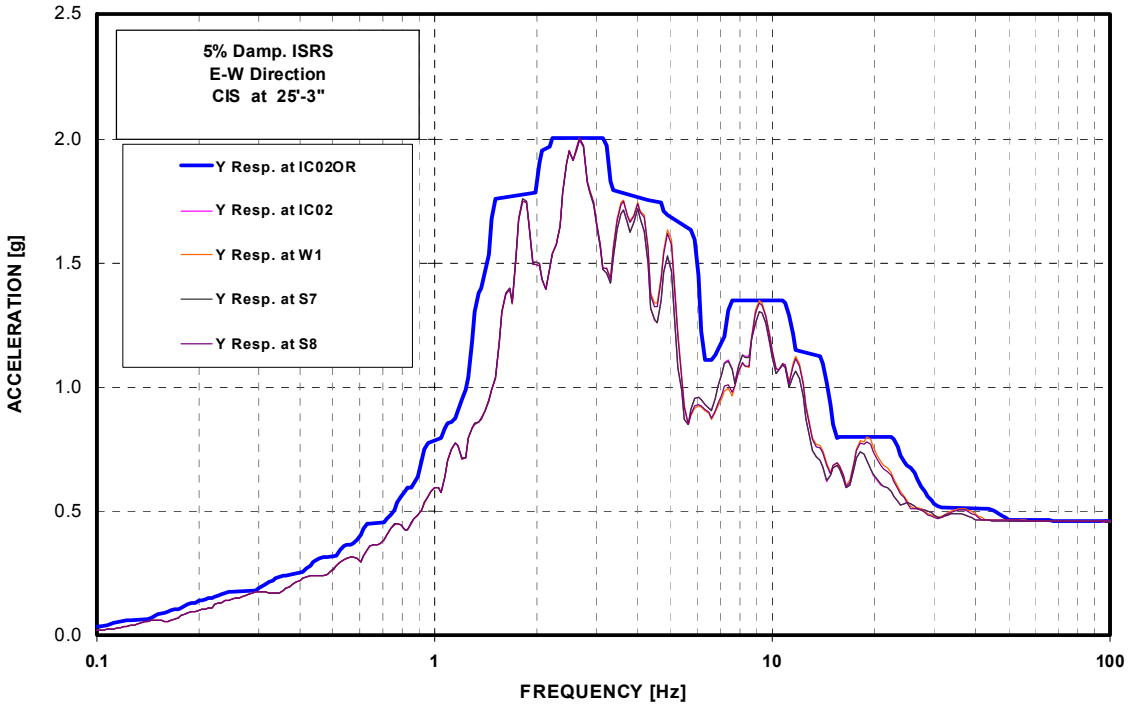

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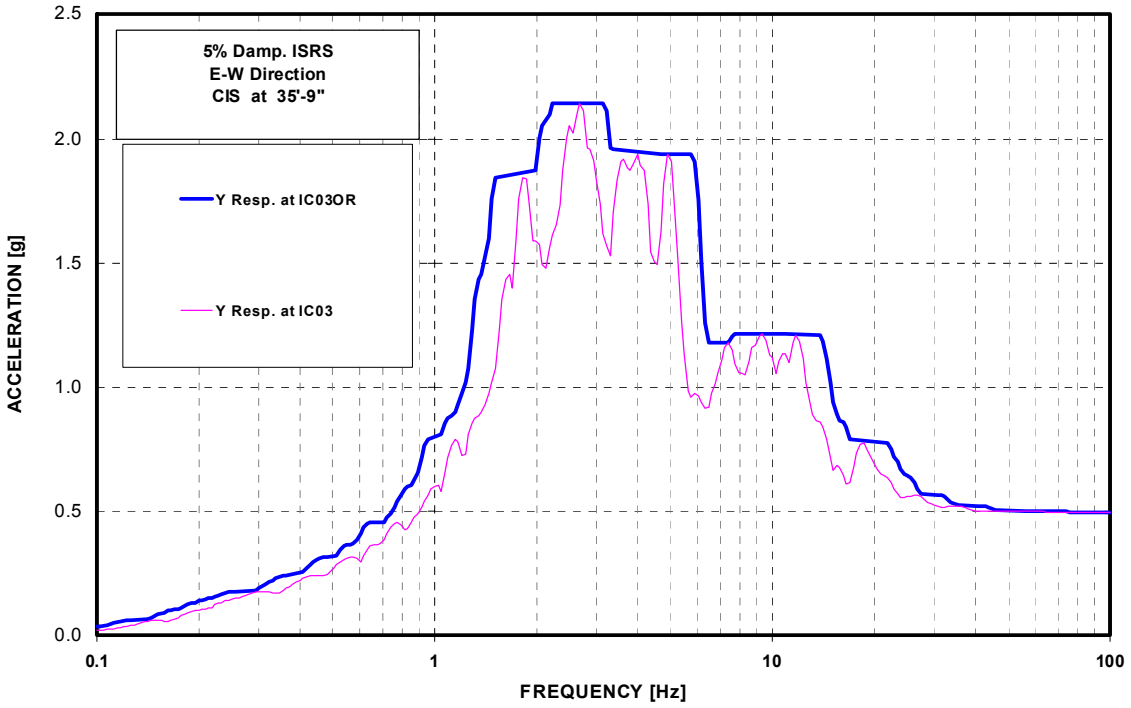

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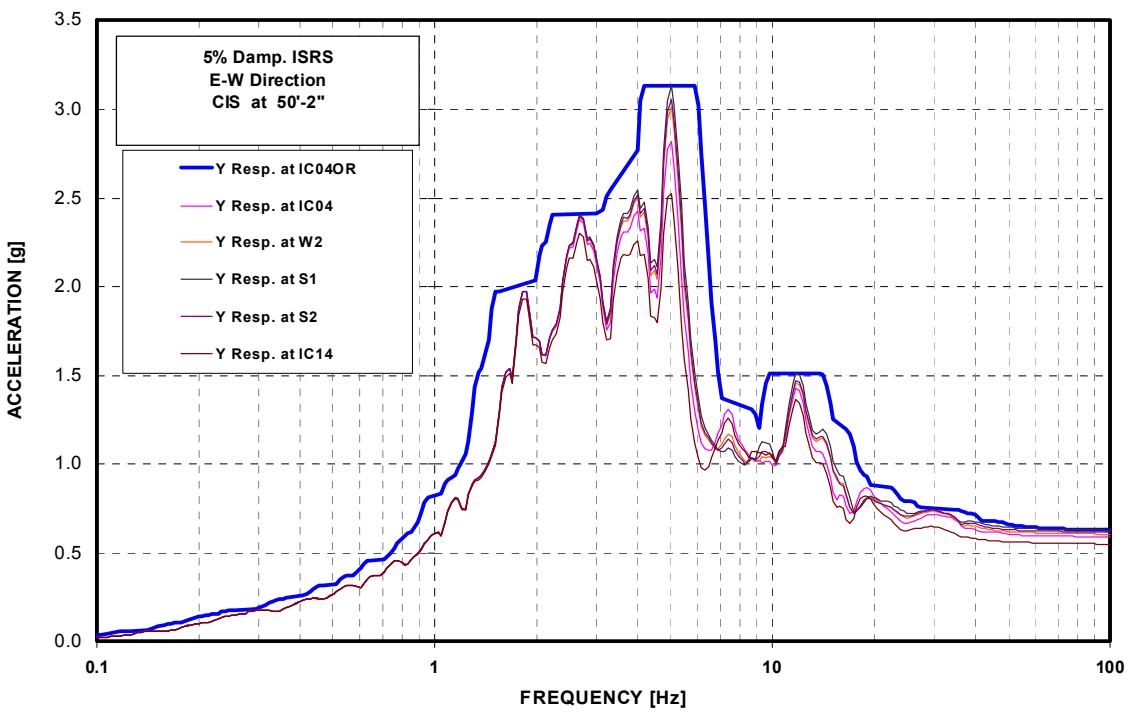

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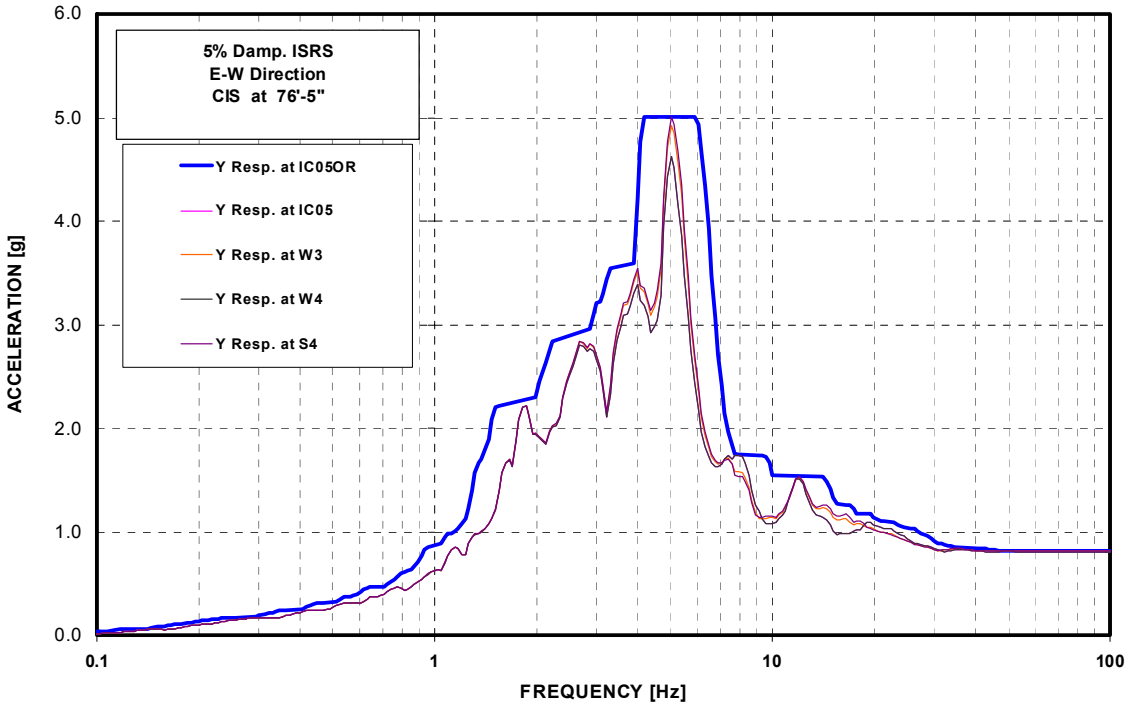

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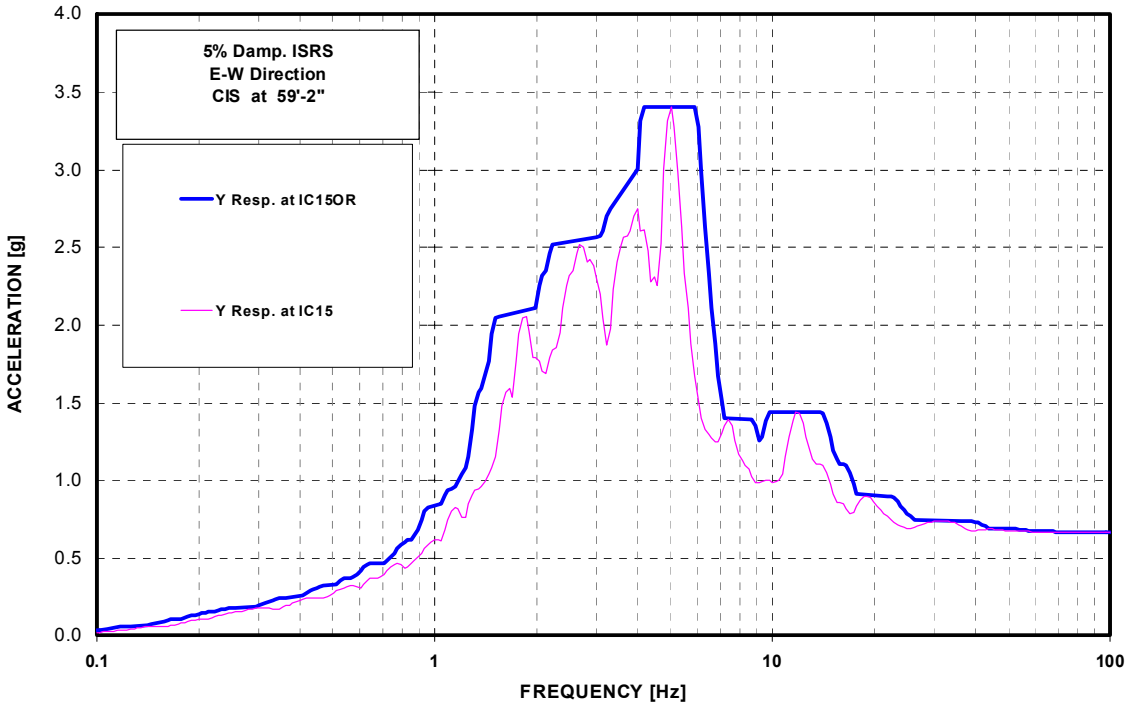

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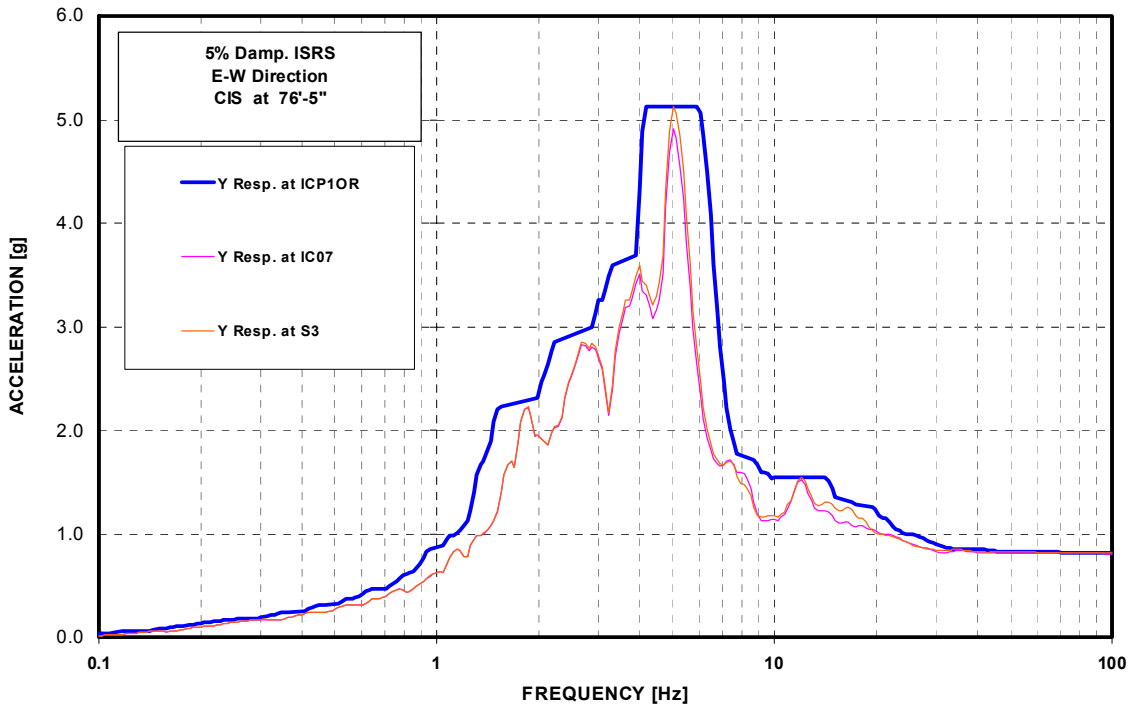
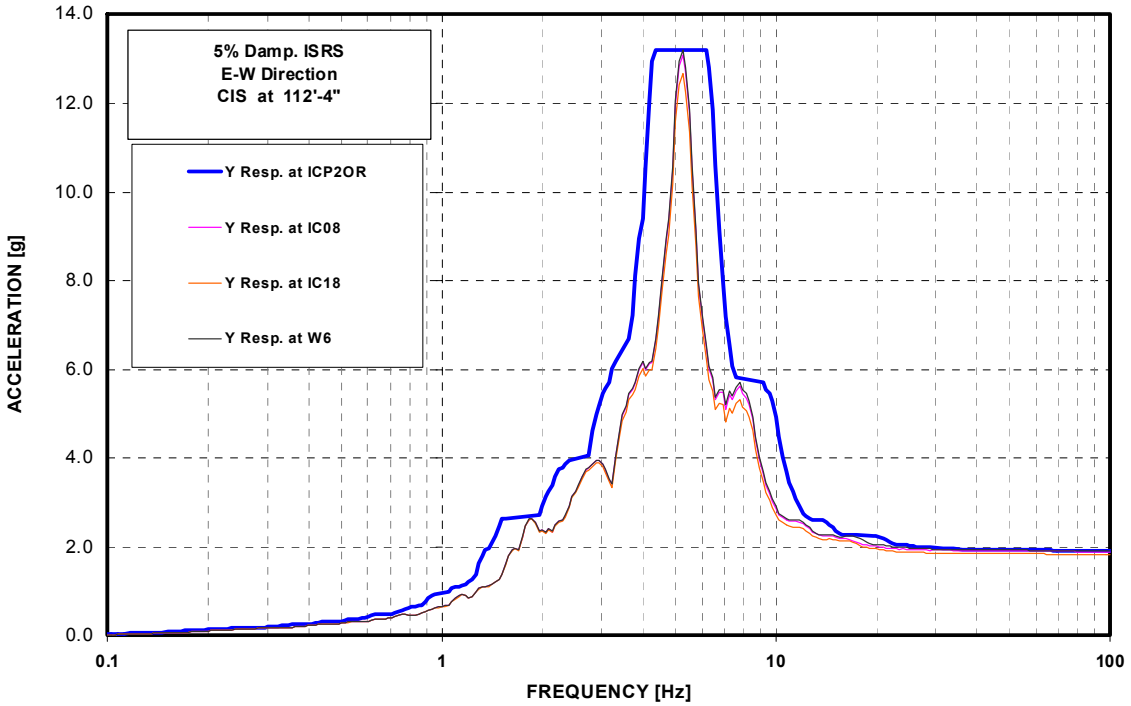


Figure 19 – ICP1 ISRS E-W Direction



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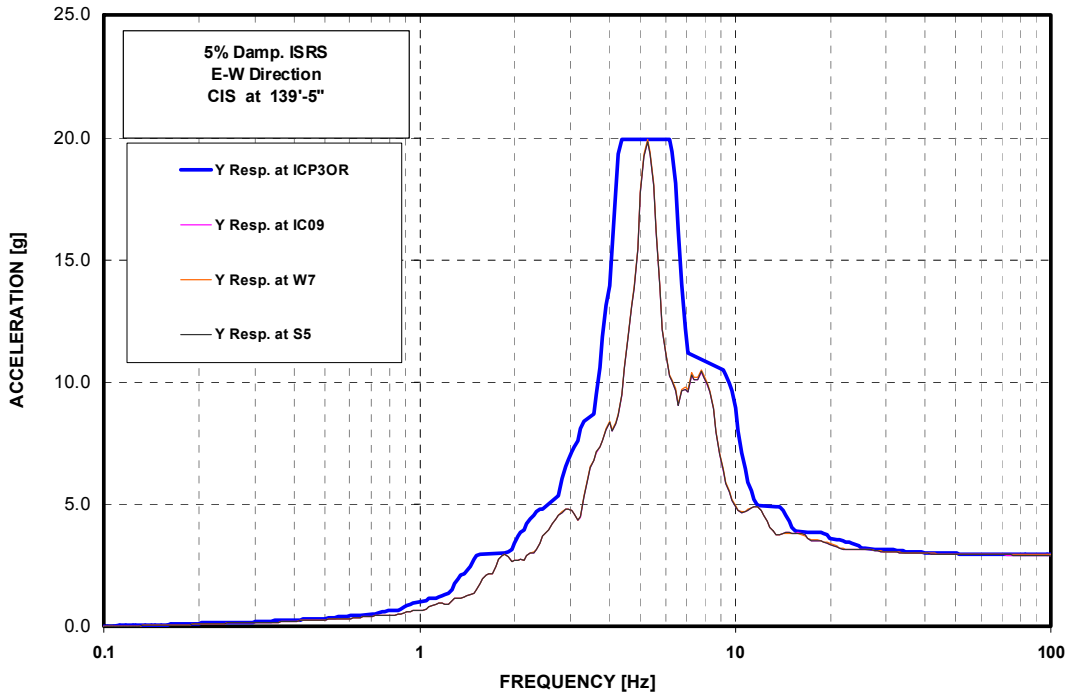

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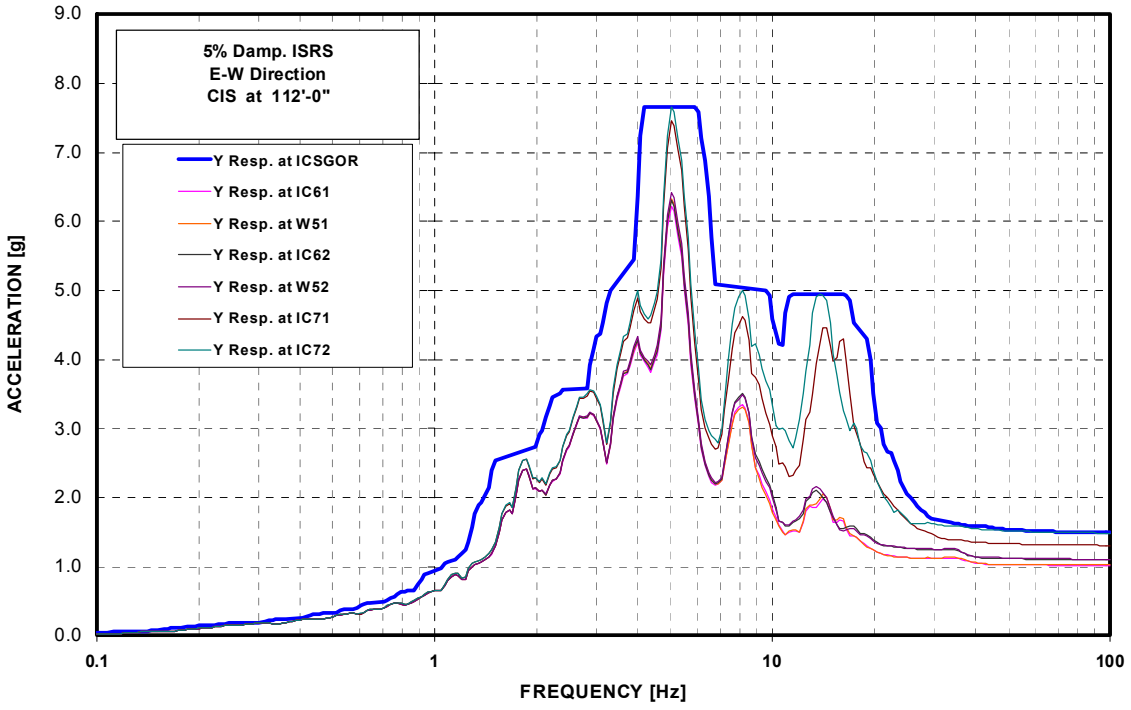
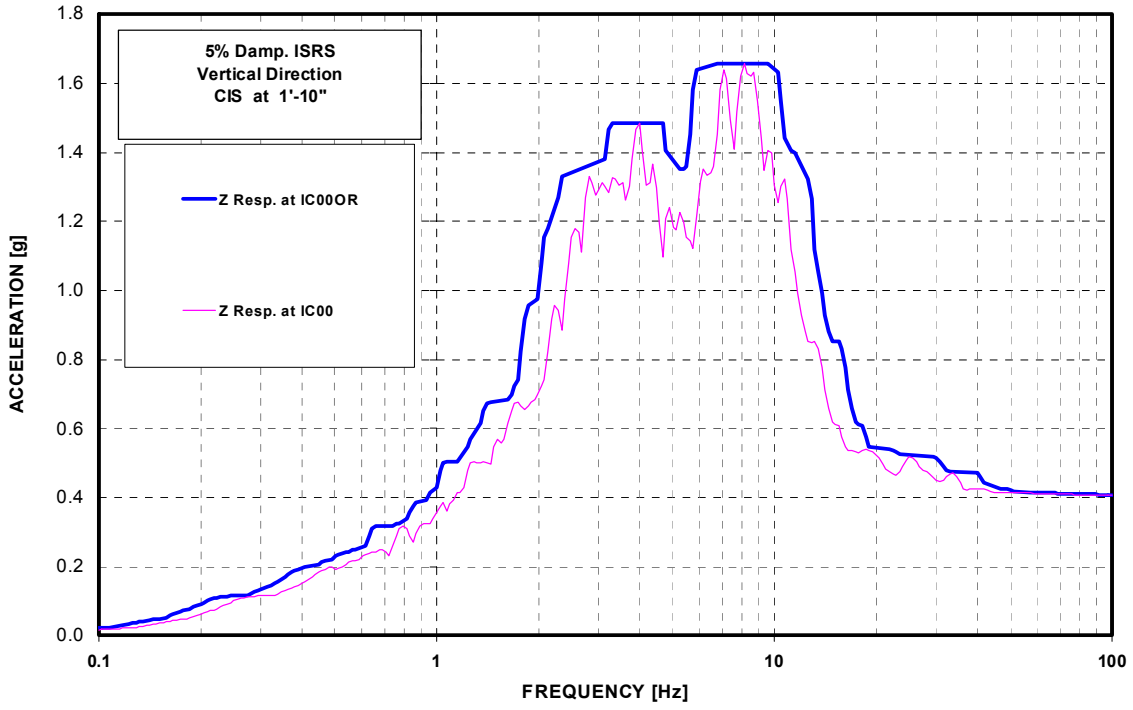


Figure 22 – ICSG ISRS E-W Direction



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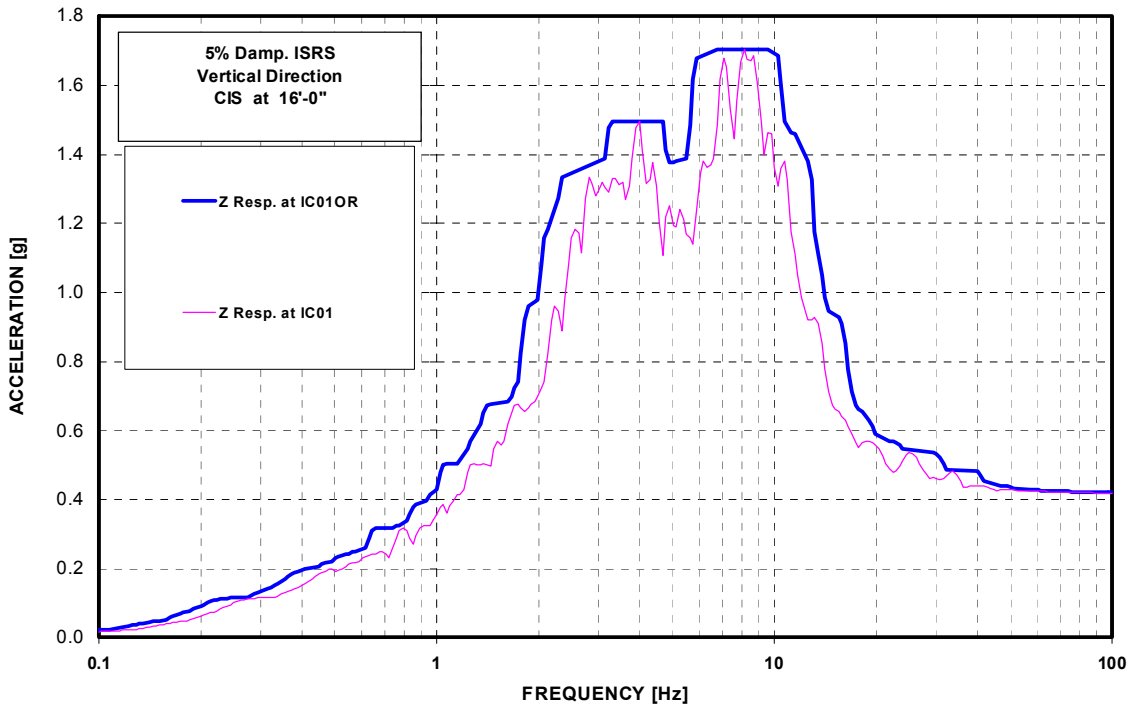


Figure 24 – IC01 ISRS Vertical Direction

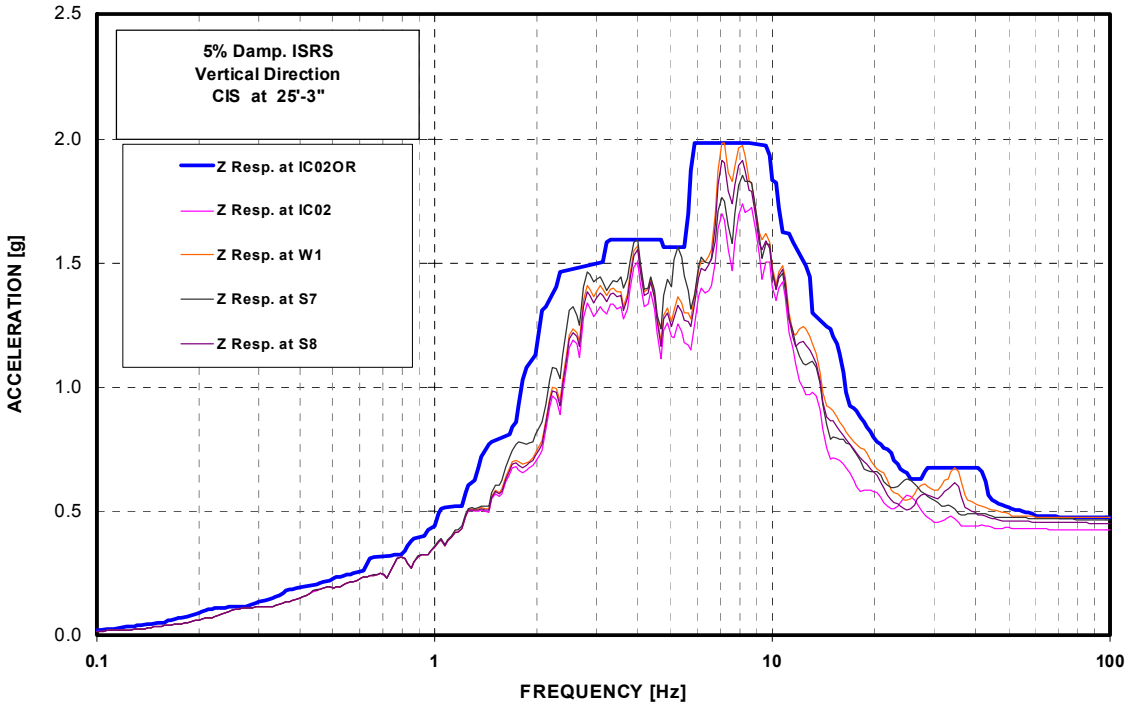


Figure 25 – IC02 ISRS Vertical Direction

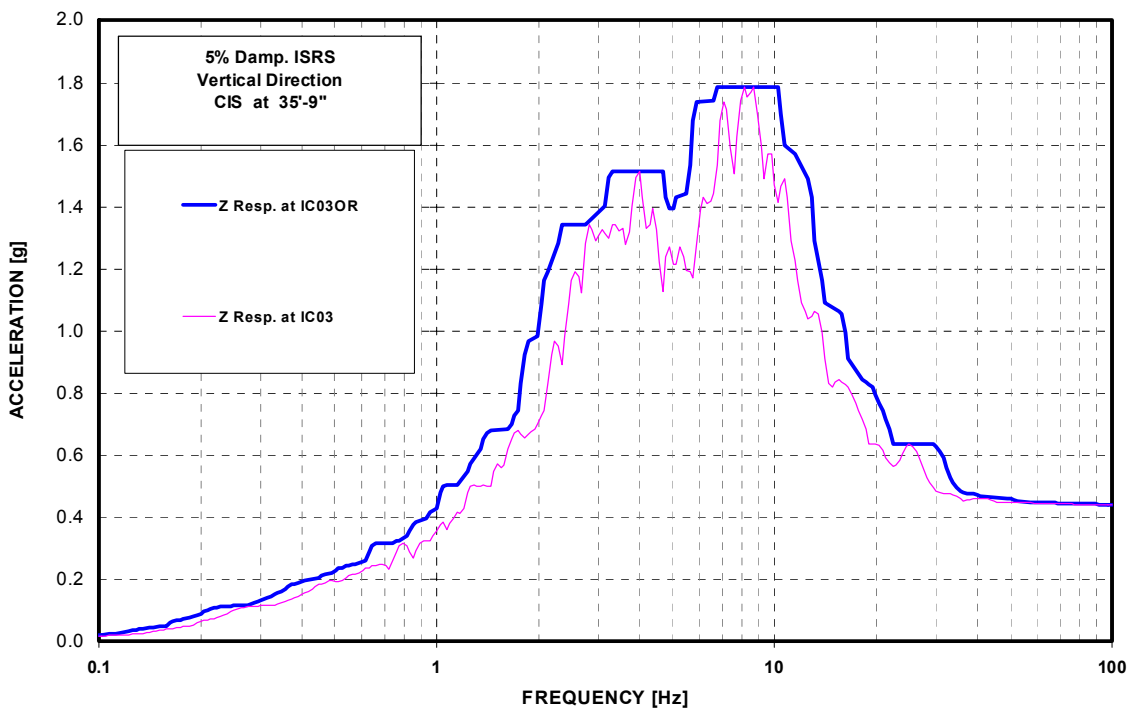


Figure 26 – IC03 ISRS Vertical Direction

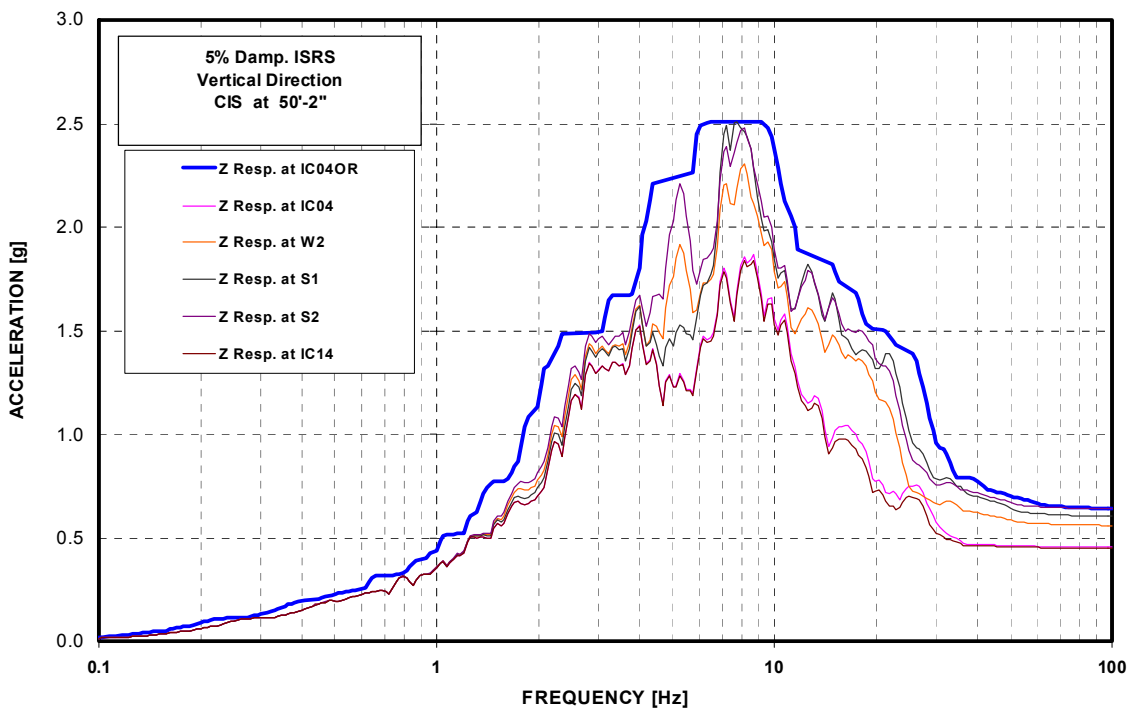


Figure 27 – IC04 ISRS Vertical Direction

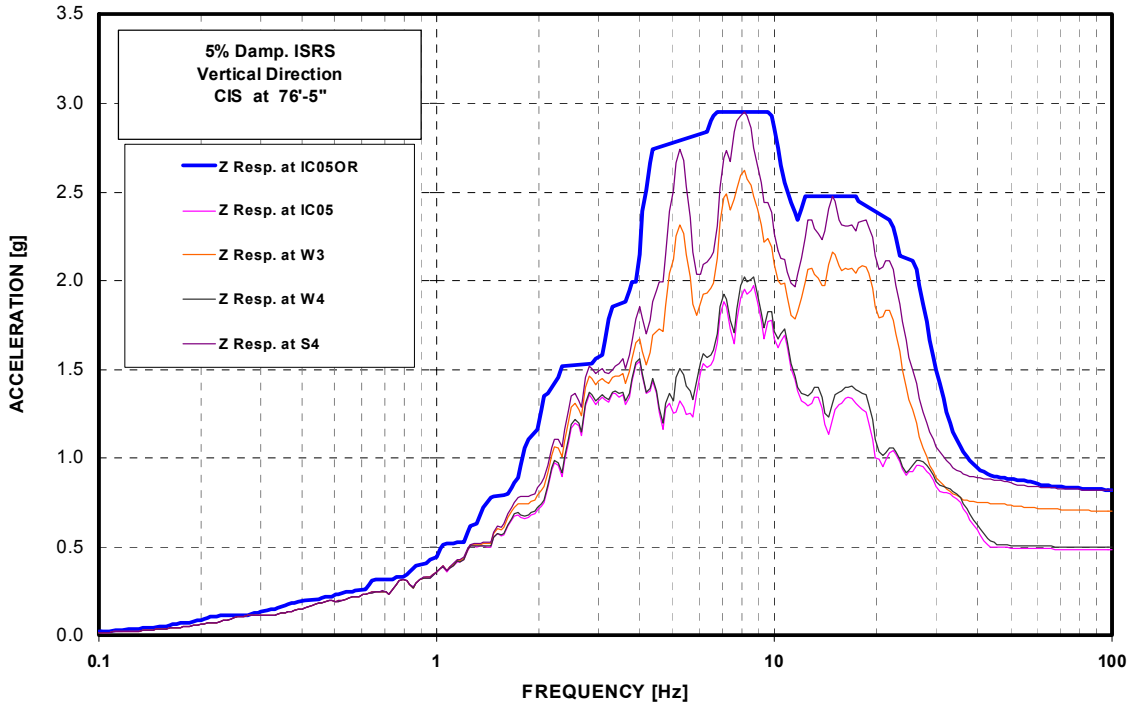


Figure 28 – IC05 ISRS Vertical Direction

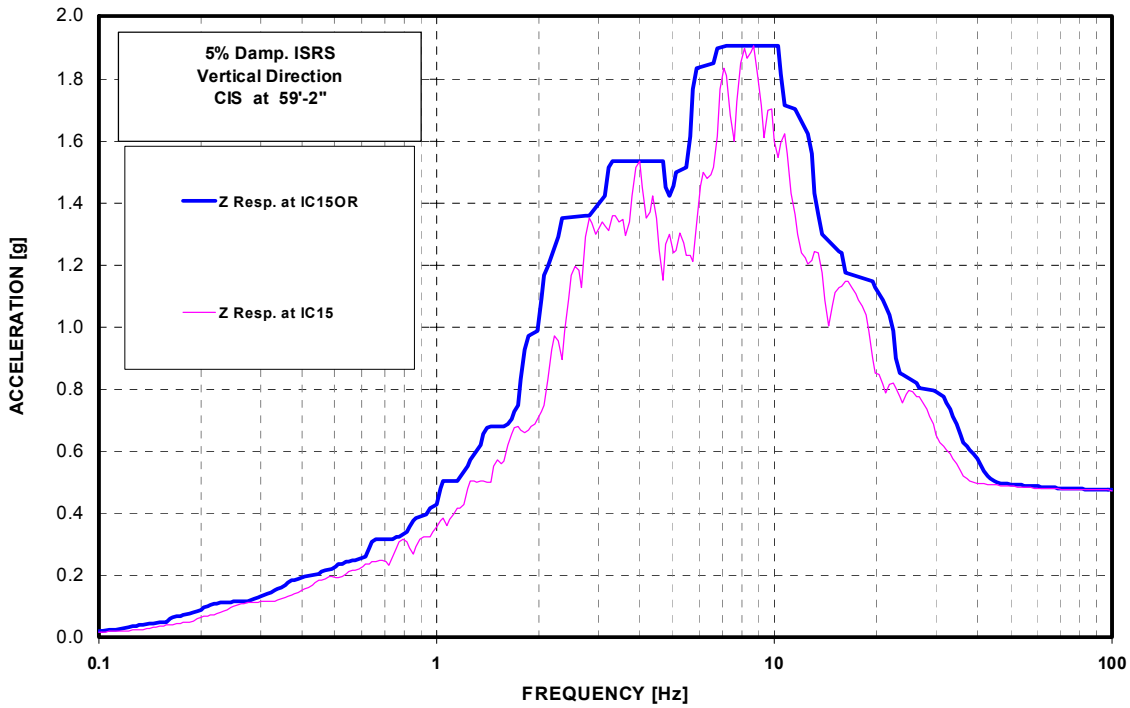
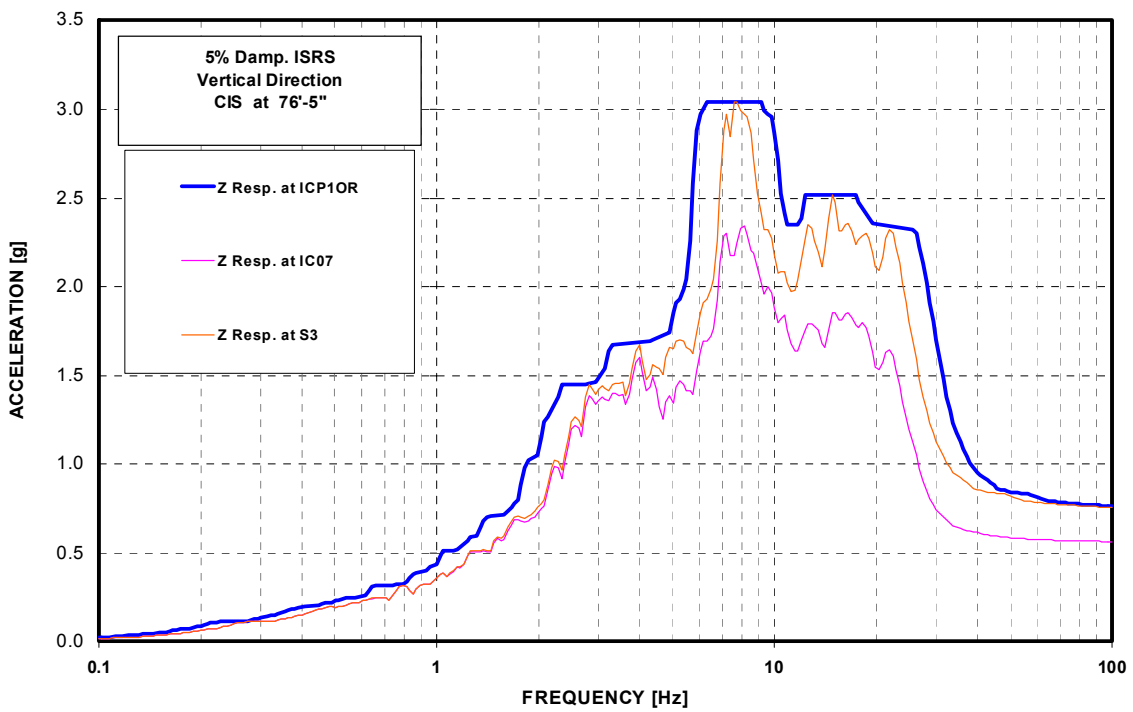


Figure 29 – IC15 ISRS Vertical Direction



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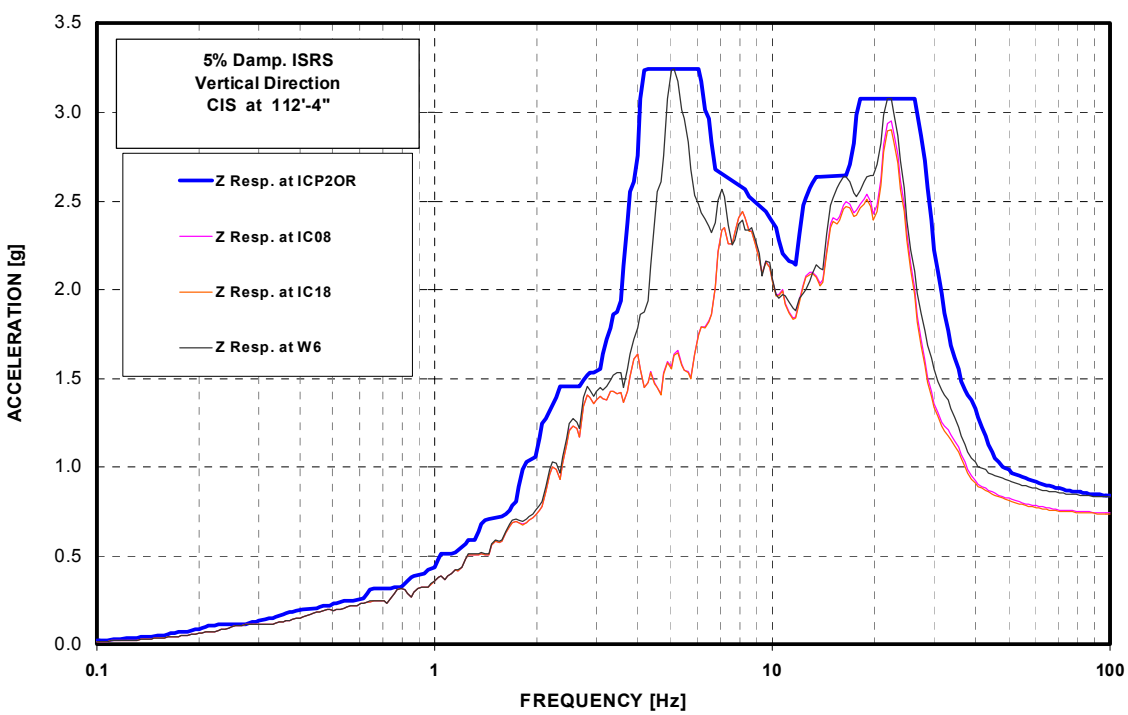

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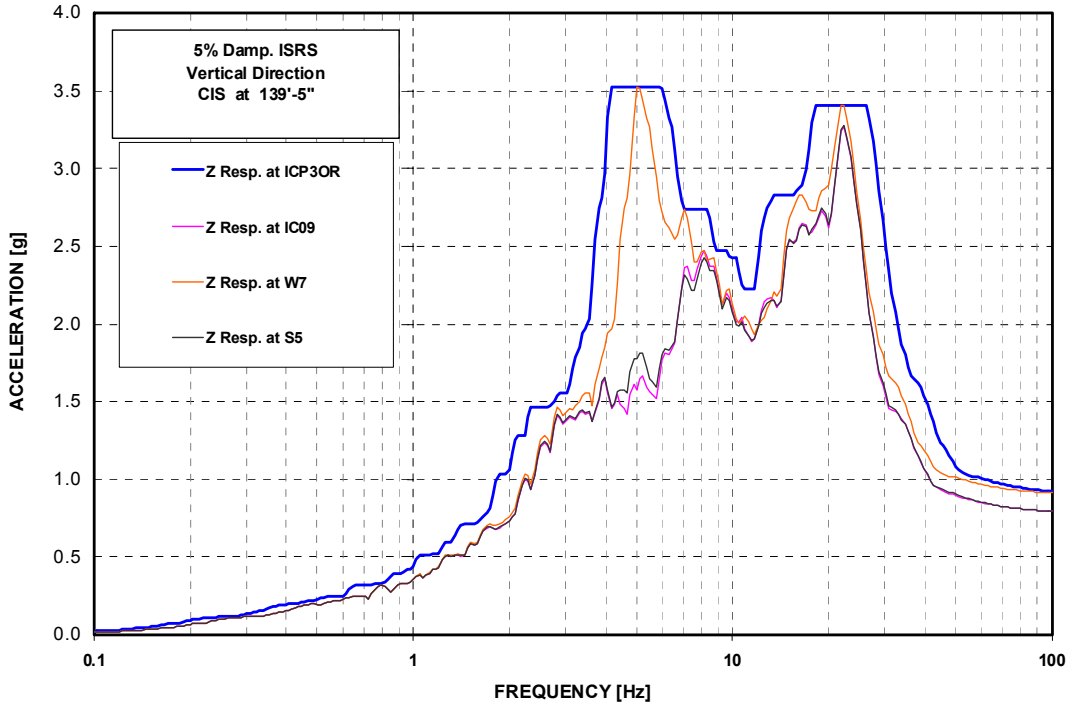

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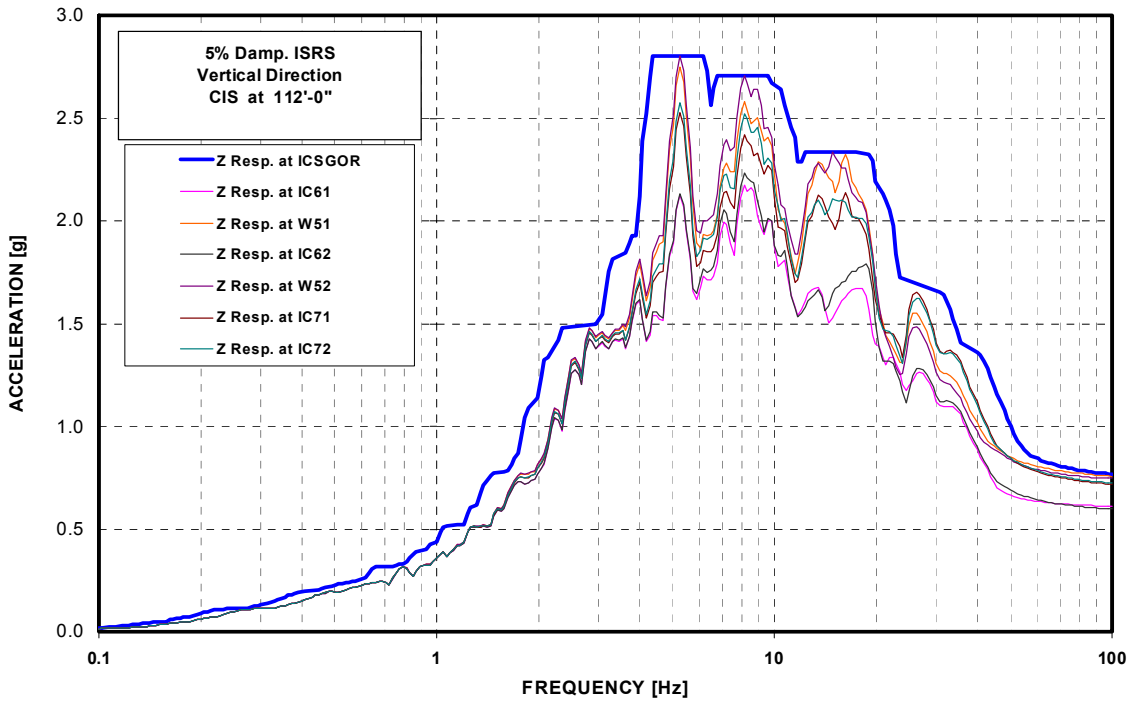

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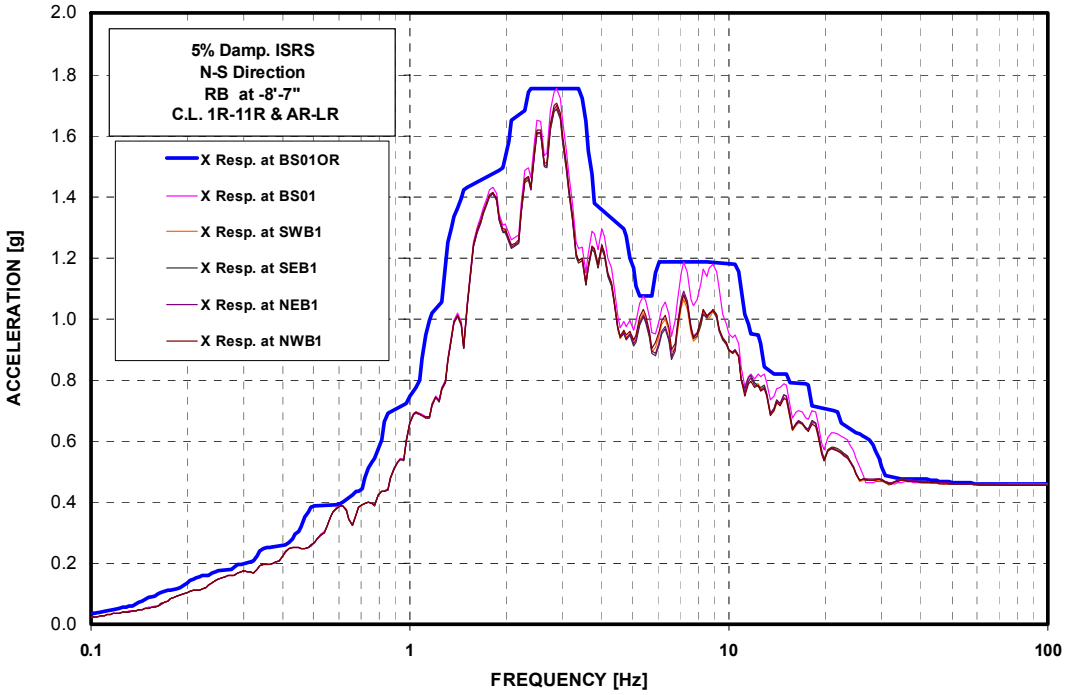


Figure 1 – BS01 ISRS N-S Direction

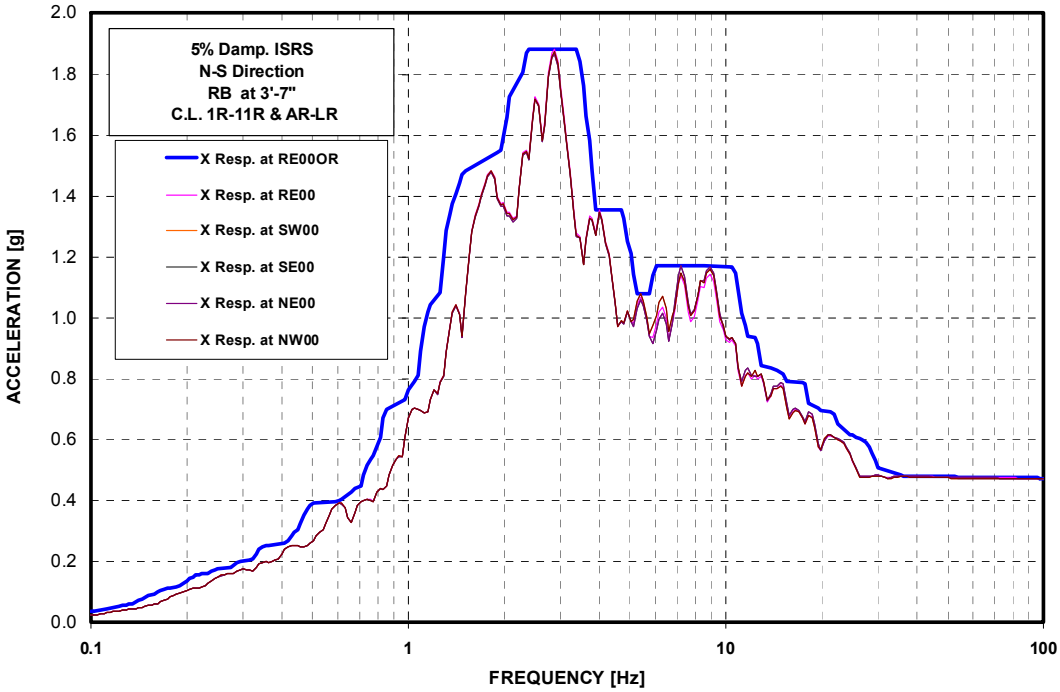


Figure 2 – RE00 ISRS N-S Direction

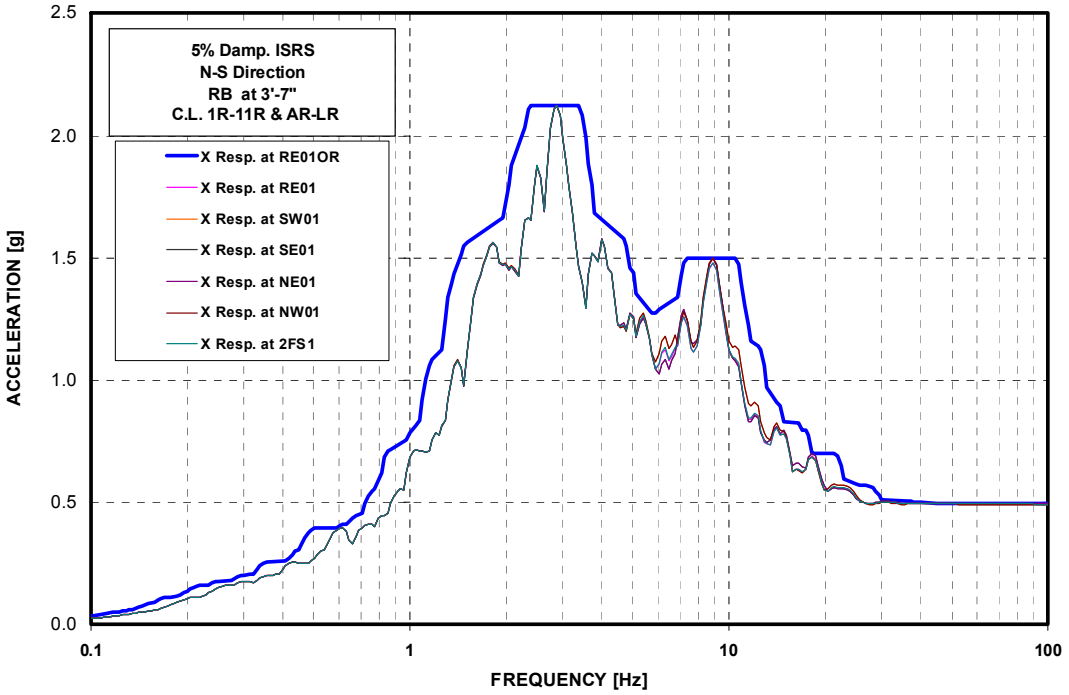


Figure 3 – RE01 ISRS N-S Direction

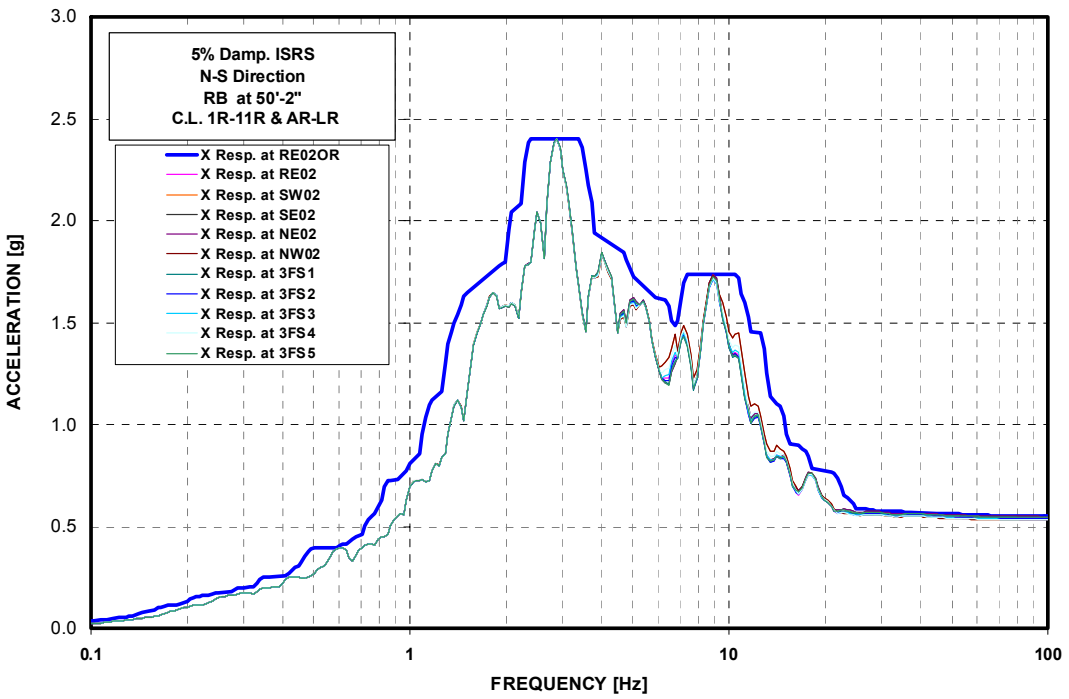
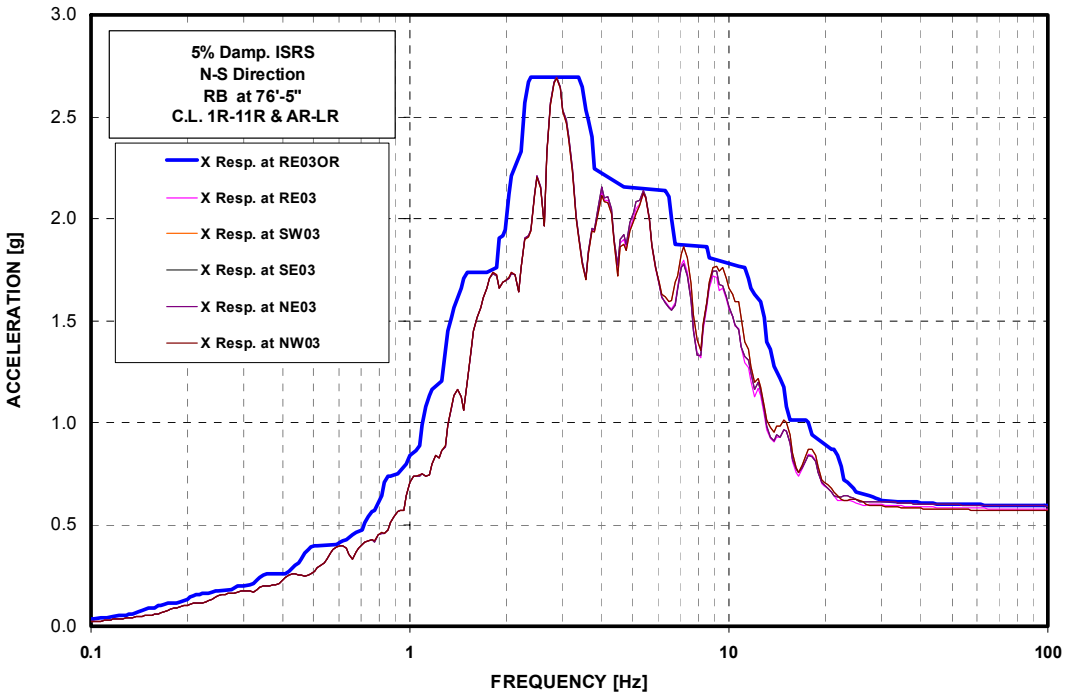


Figure 4 – RE02 ISRS N-S Direction



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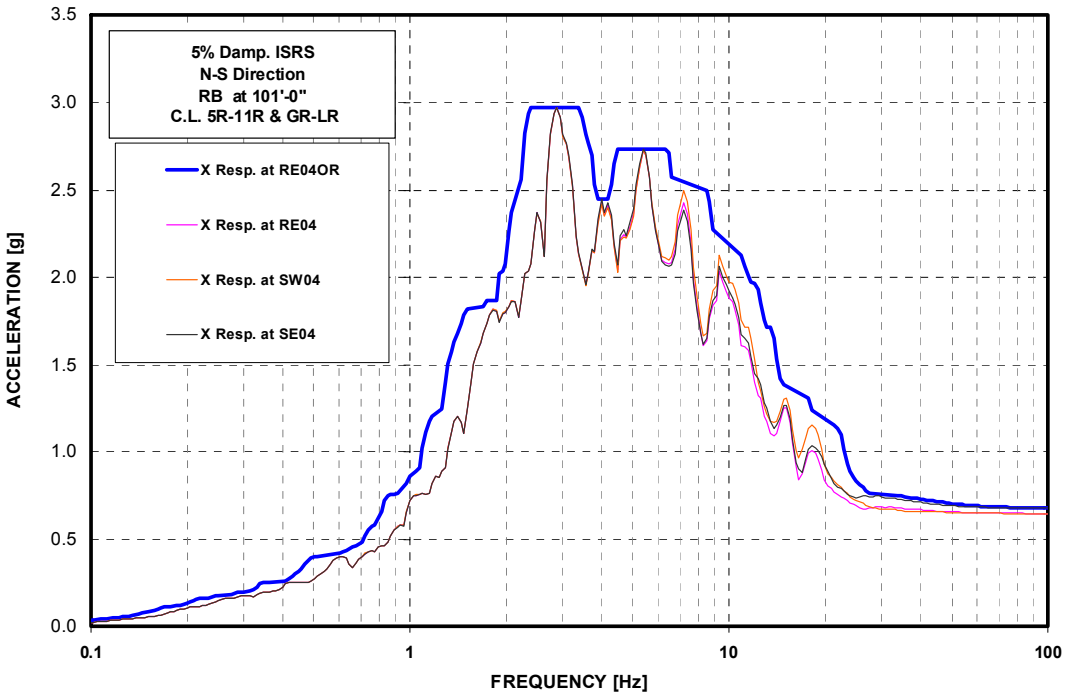


Figure 6 – RE04 ISRS N-S Direction

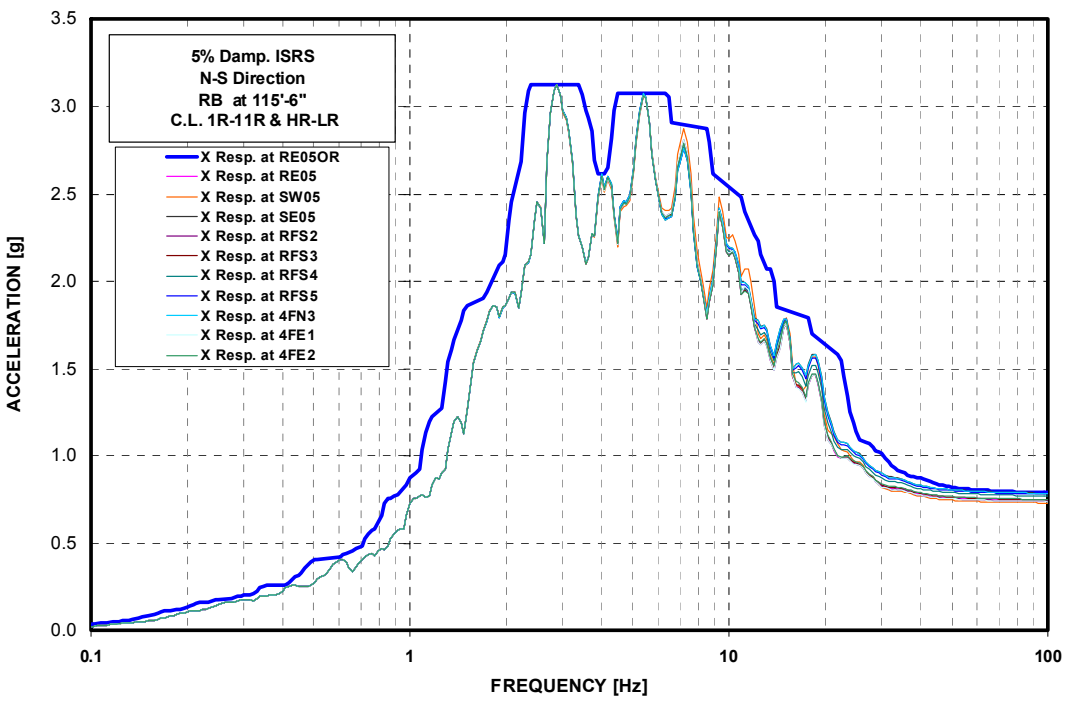


Figure 7 – RE05 ISRS N-S Direction

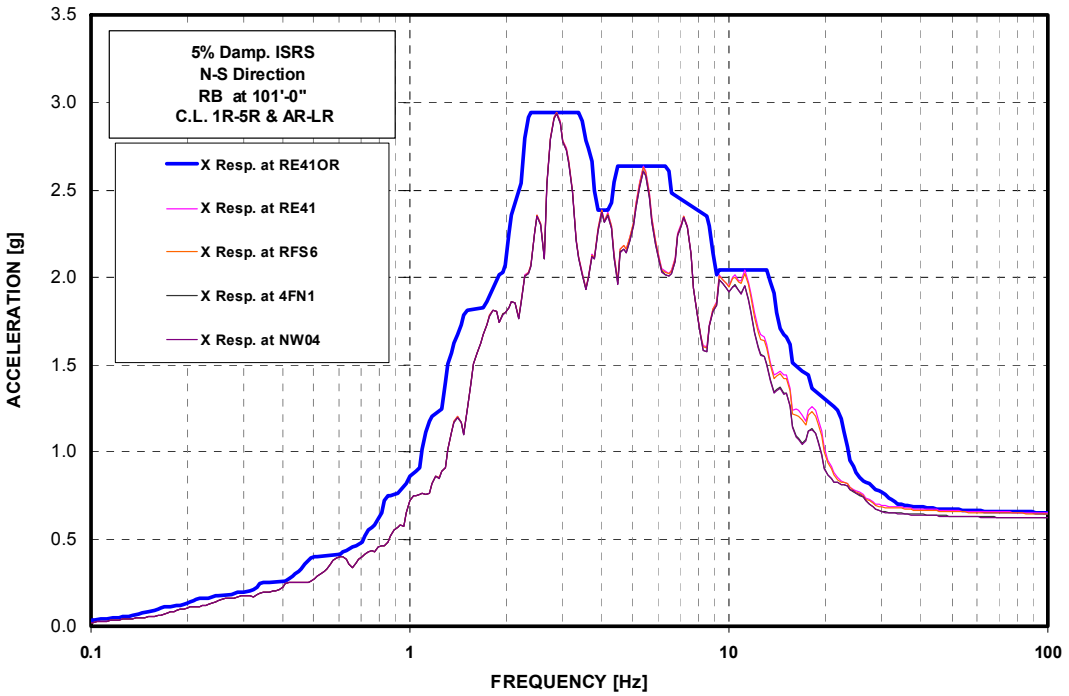


Figure 8 – RE41 ISRS N-S Direction

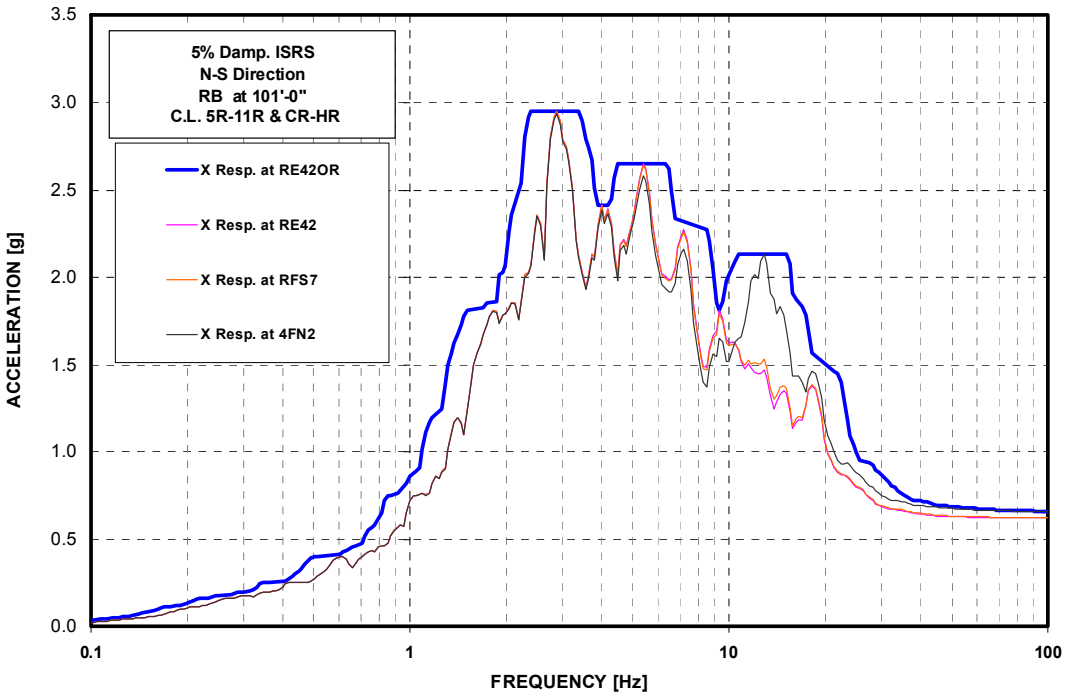


Figure 9 – RE42 ISRS N-S Direction

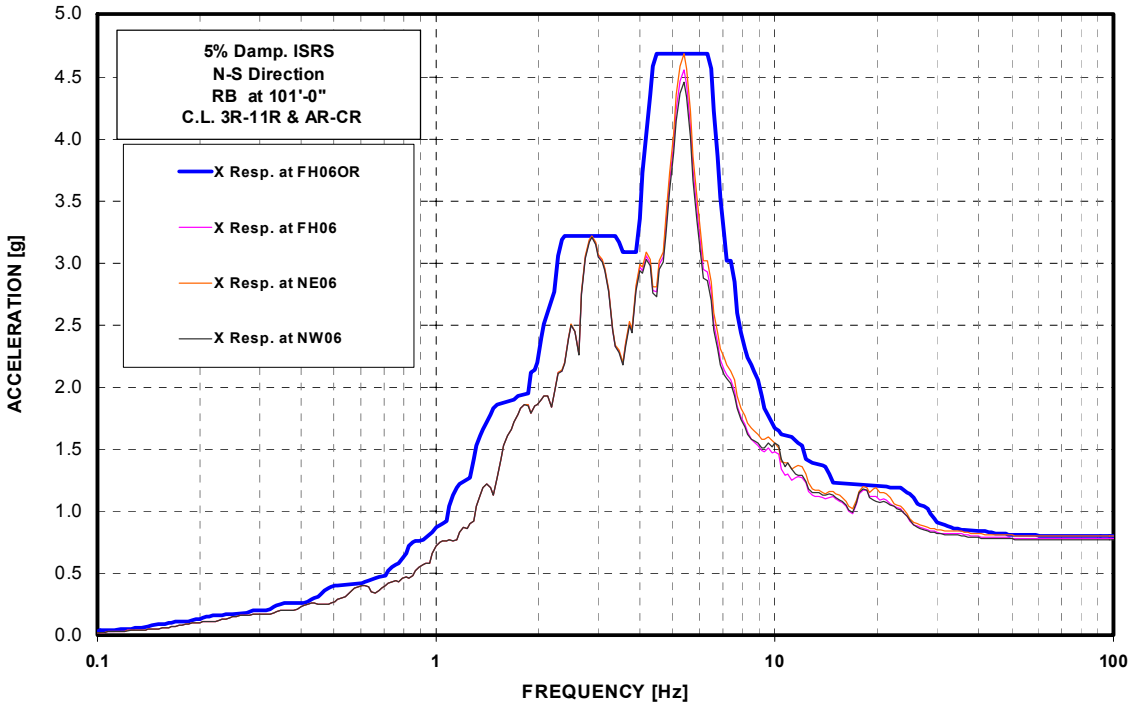


Figure 10 – FH06 ISRS N-S Direction

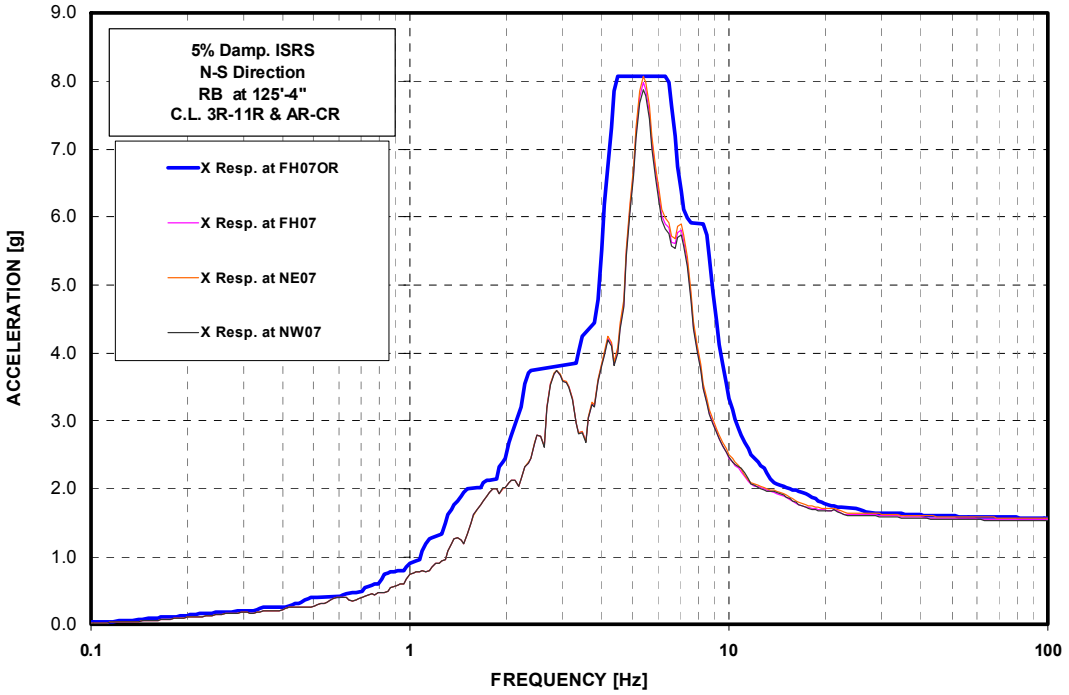


Figure 11 – FH07 ISRS N-S Direction

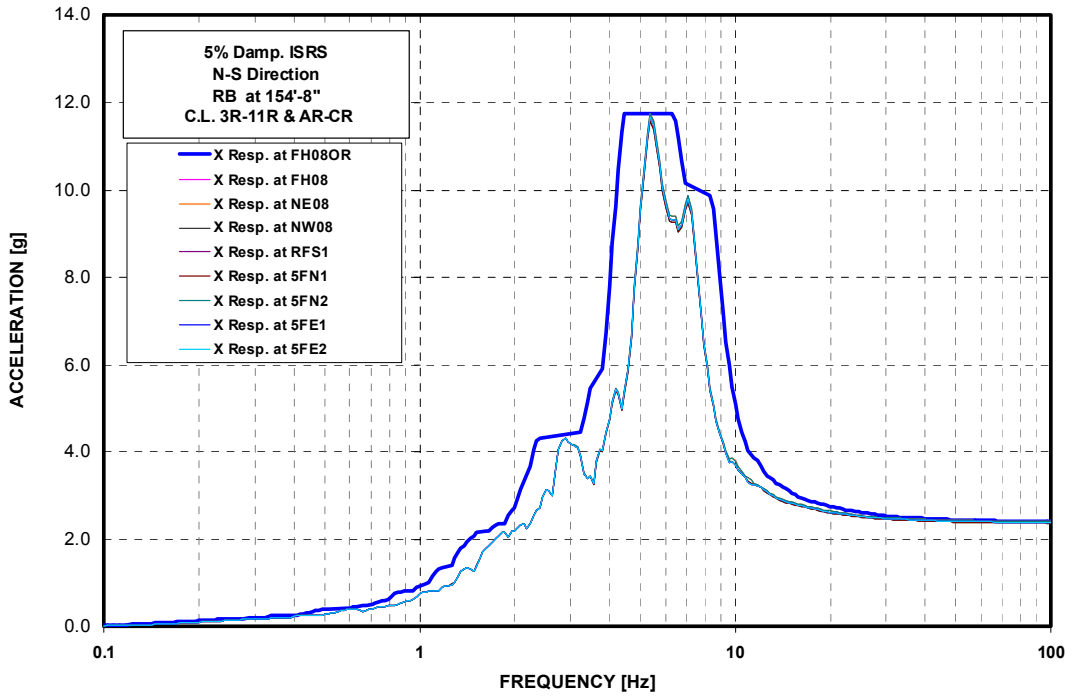


Figure 12 – FH08 ISRS N-S Direction

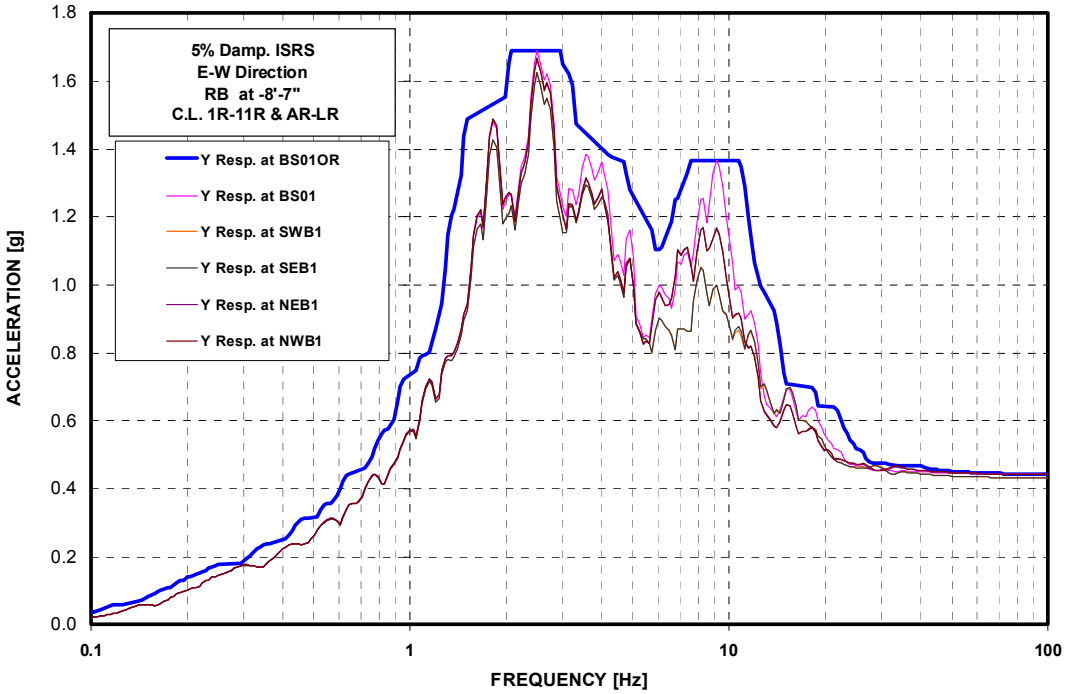


Figure 13 – BS01 ISRS E-W Direction

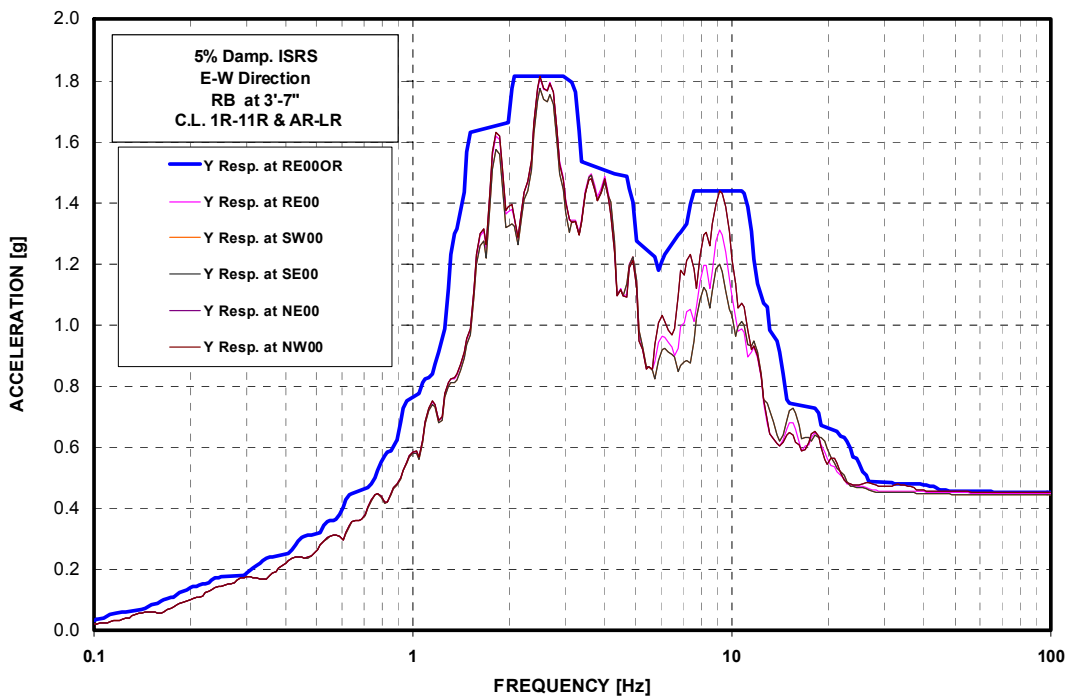


Figure 14 – RE00 ISRS E-W Direction

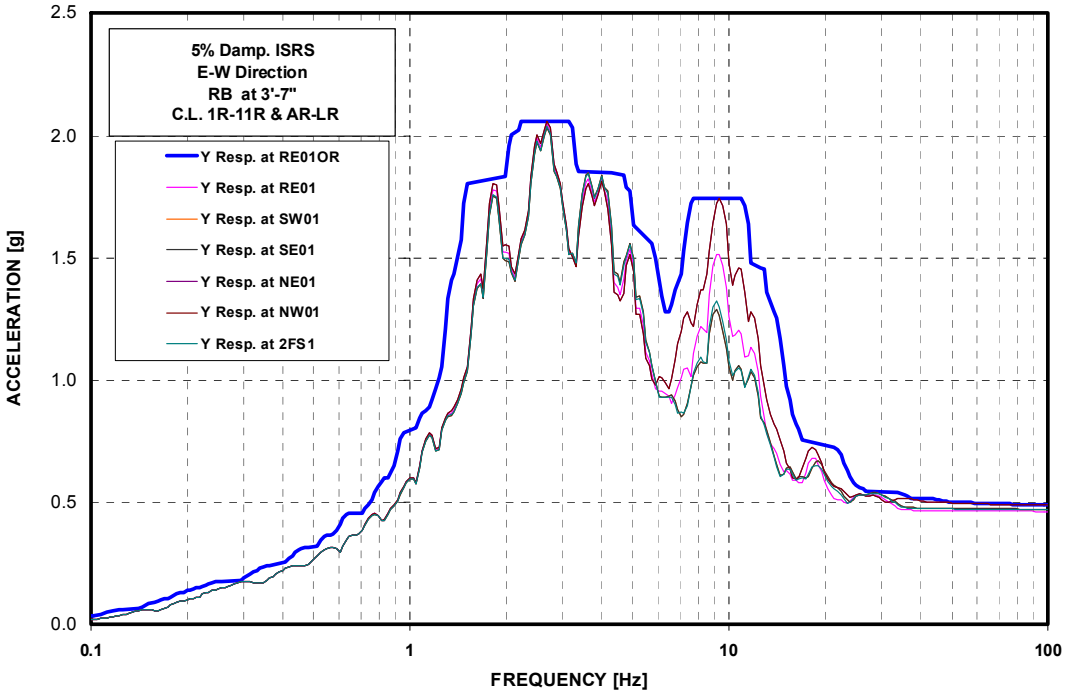


Figure 15 – RE01 ISRS E-W Direction

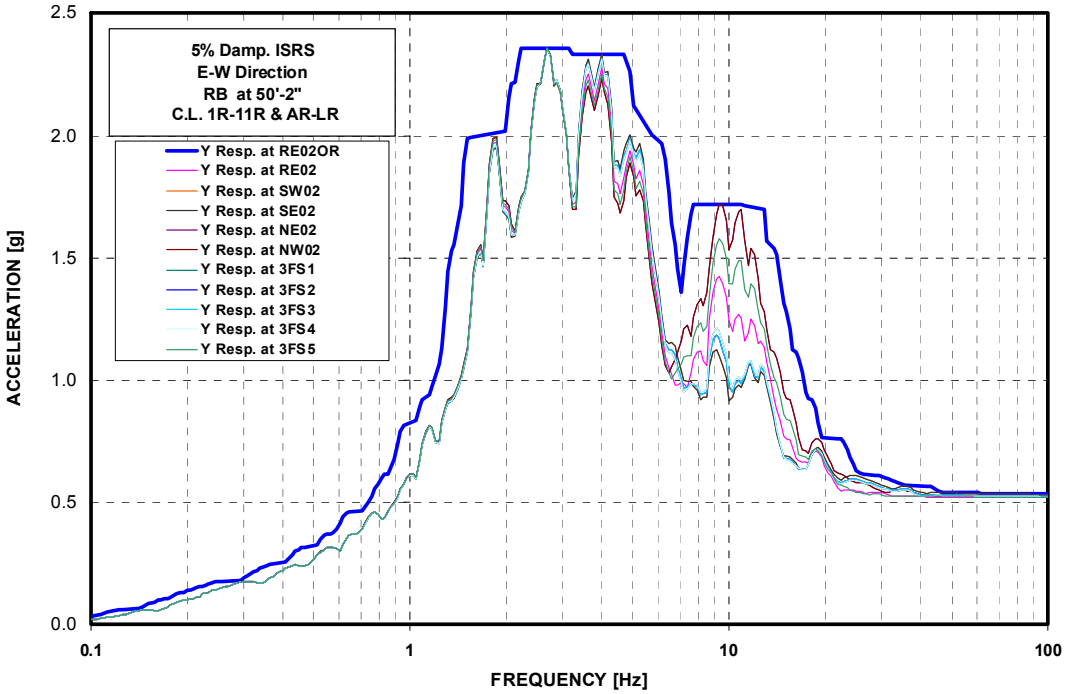


Figure 16 – RE02 ISRS E-W Direction

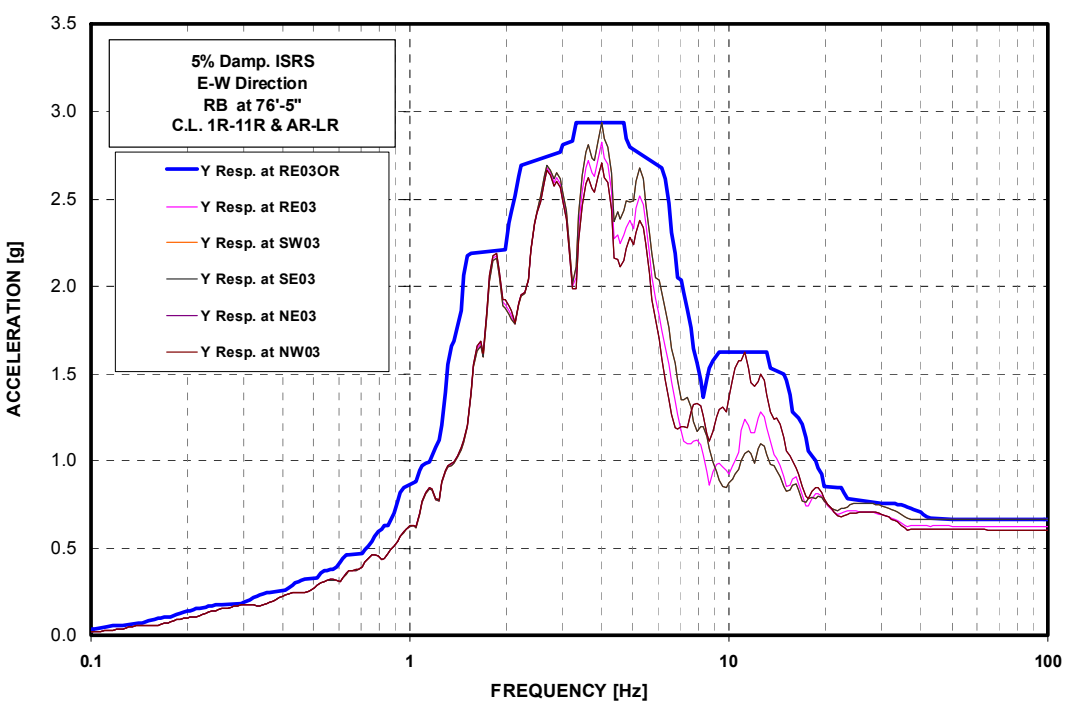


Figure 17 – RE03 ISRS E-W Direction

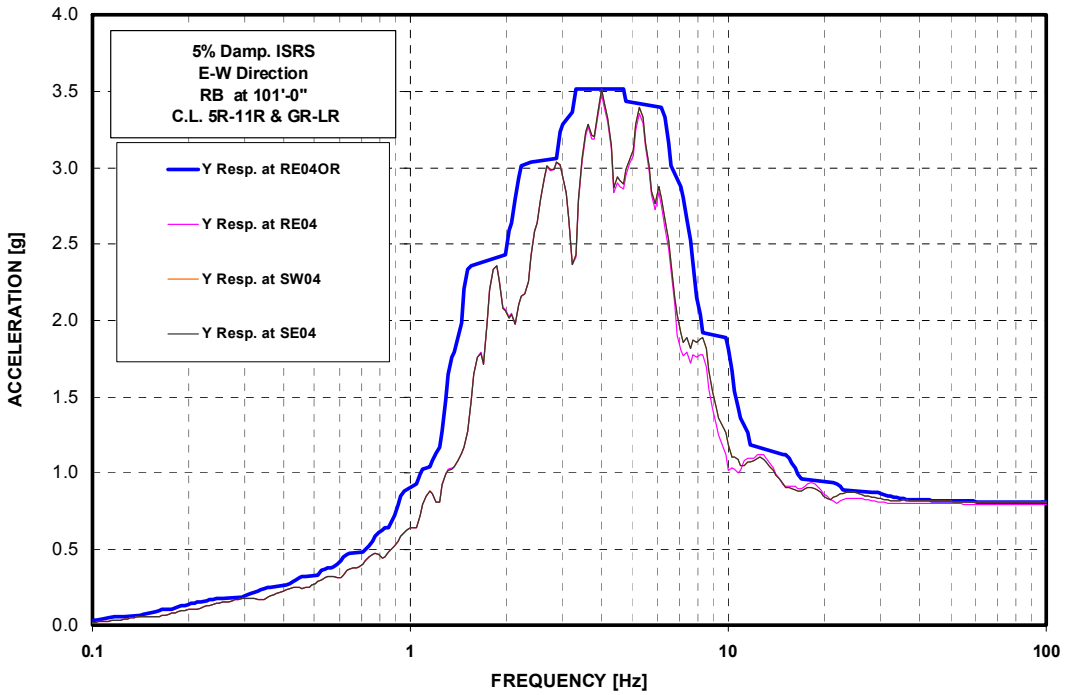


Figure 18 – RE04 ISRS E-W Direction

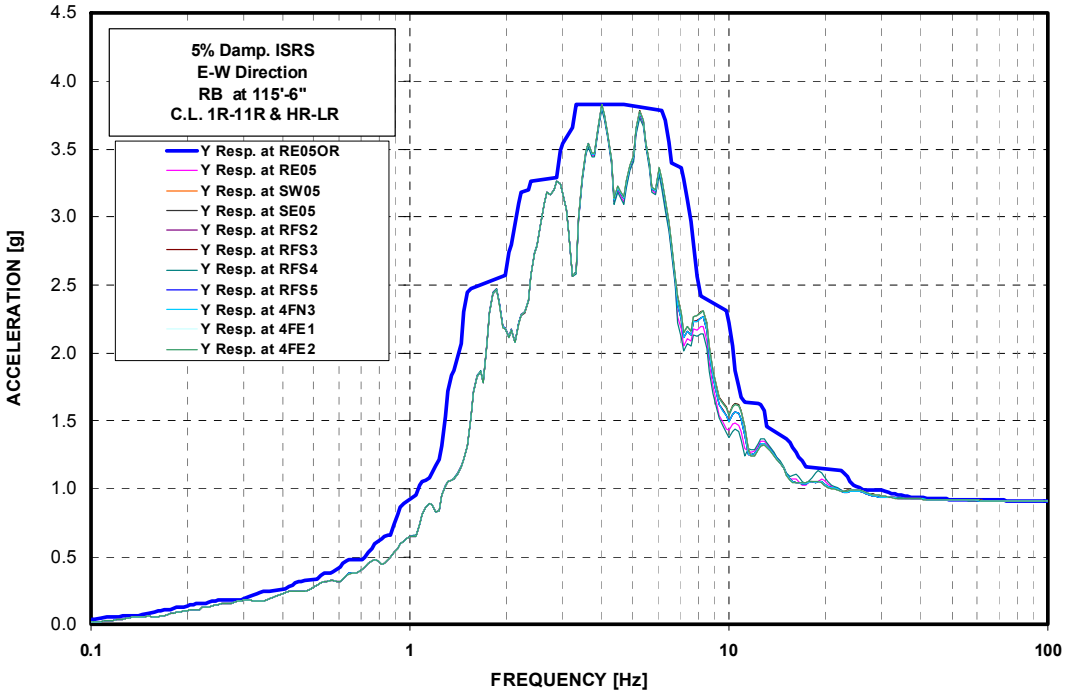


Figure 19 – RE05 ISRS E-W Direction

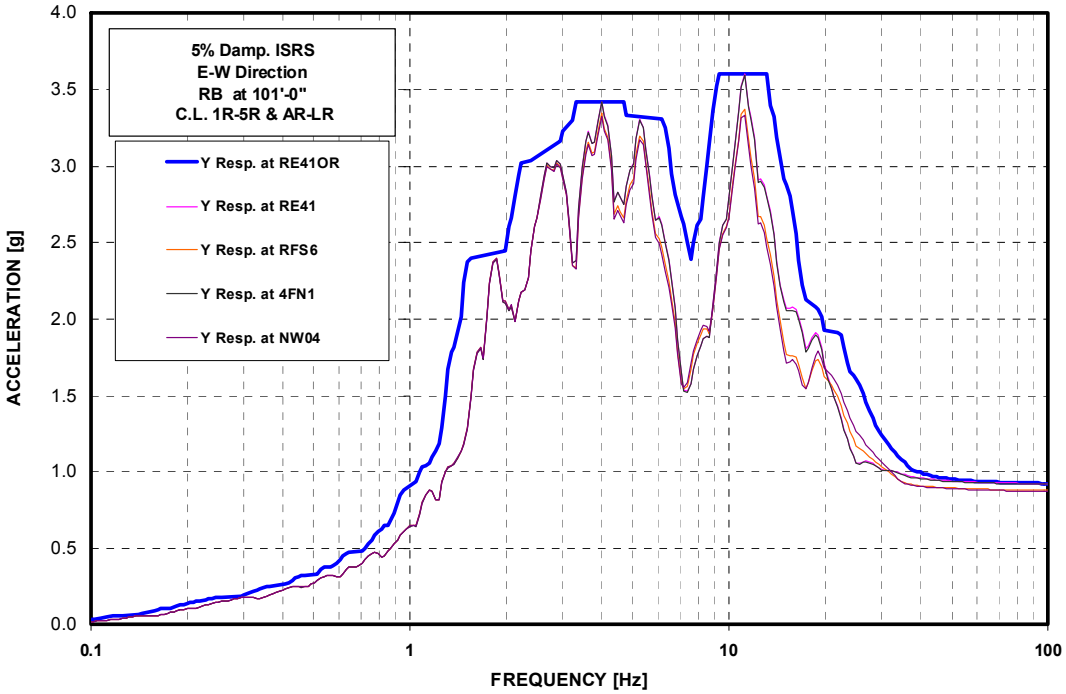


Figure 20 – RE41 ISRS E-W Direction

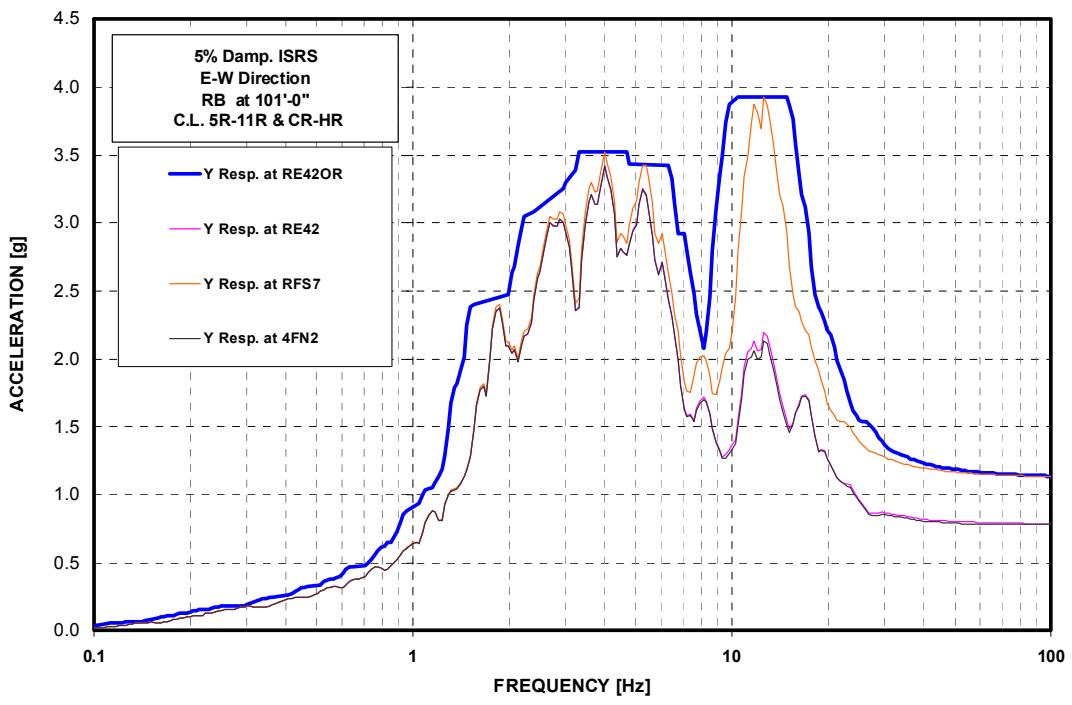


Figure 21 – RE42 ISRS E-W Direction

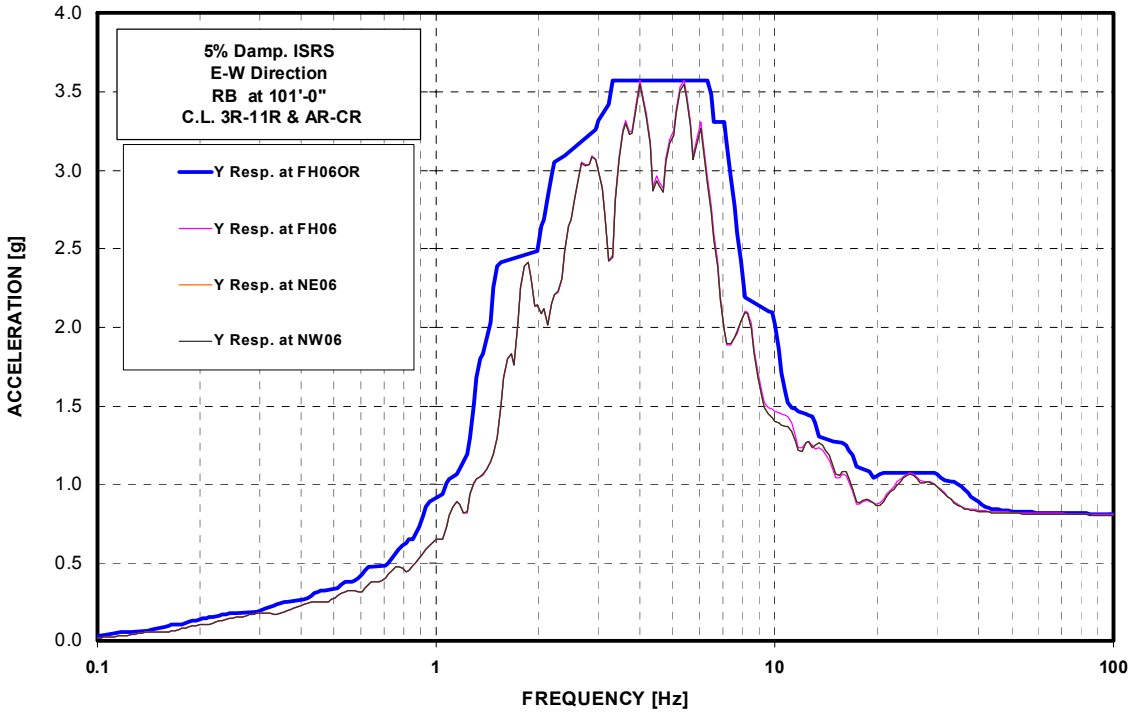


Figure 22 – FH06 ISRS E-W Direction

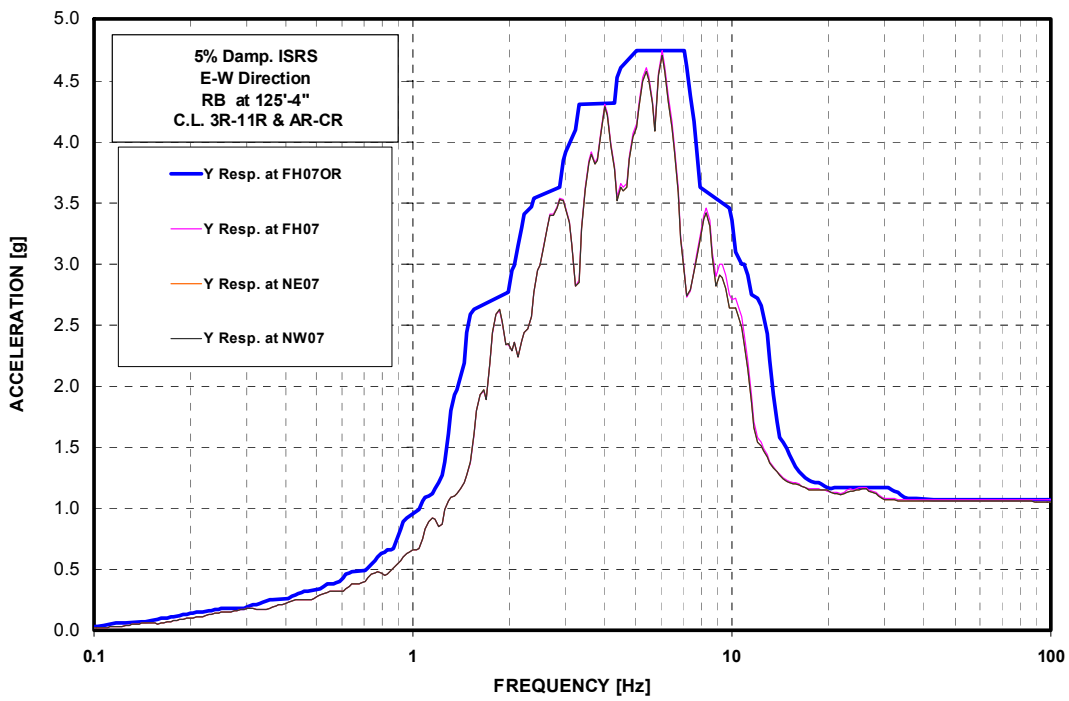


Figure 23 – FH07 ISRS E-W Direction

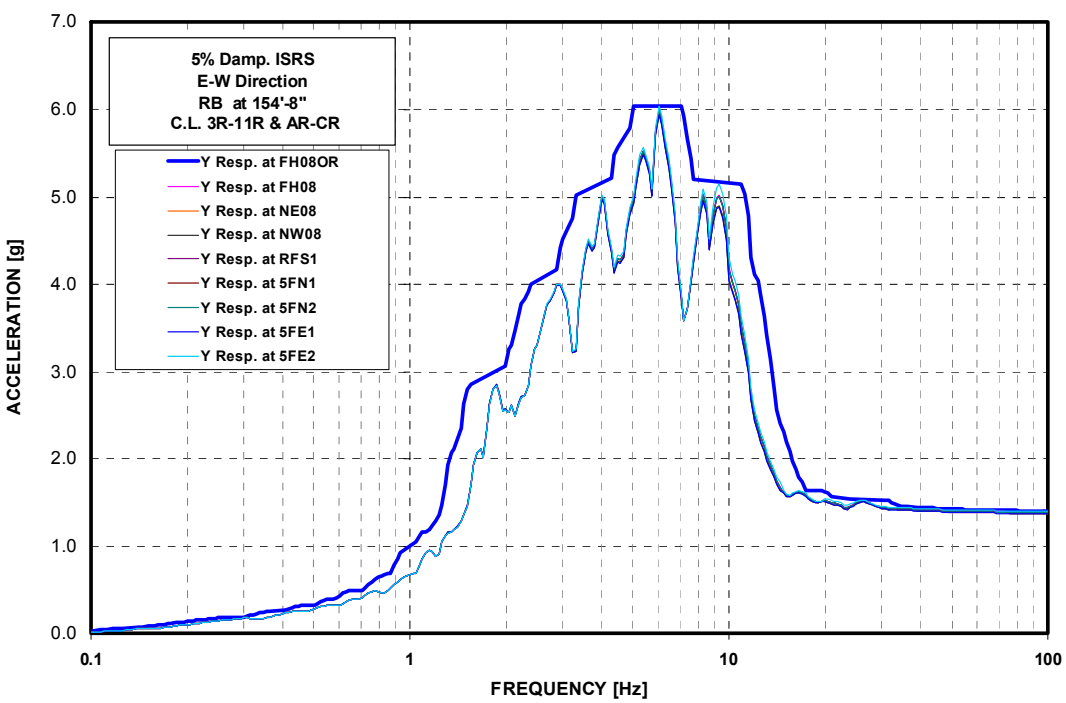


Figure 24 – FH08 ISRS E-W Direction

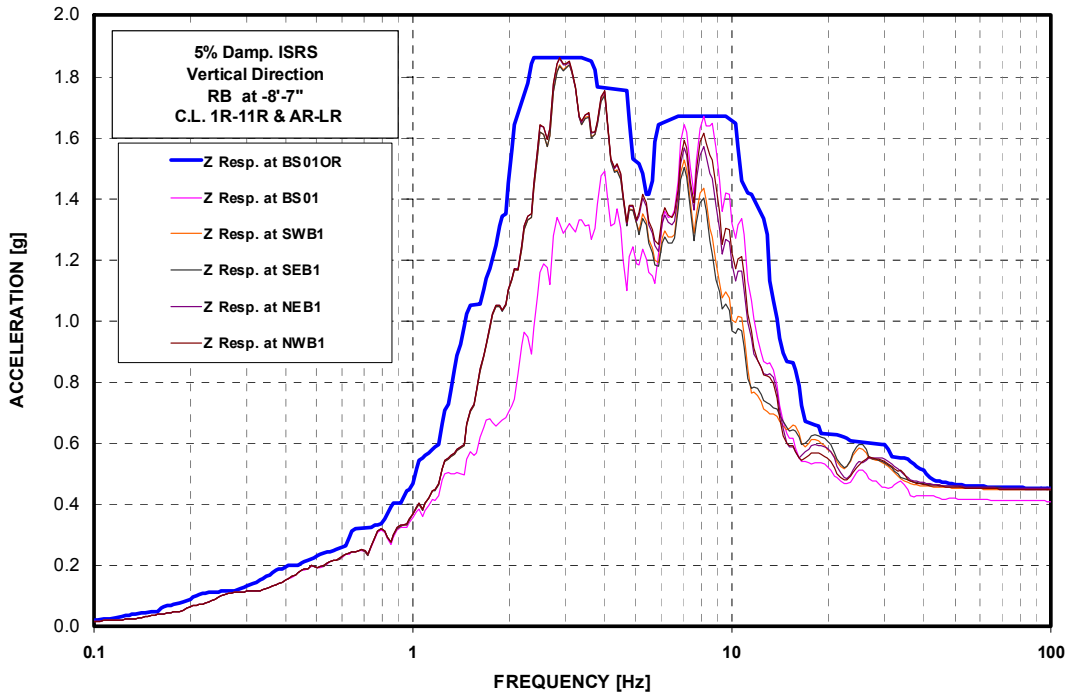


Figure 25 – BS01 ISRS Vertical Direction

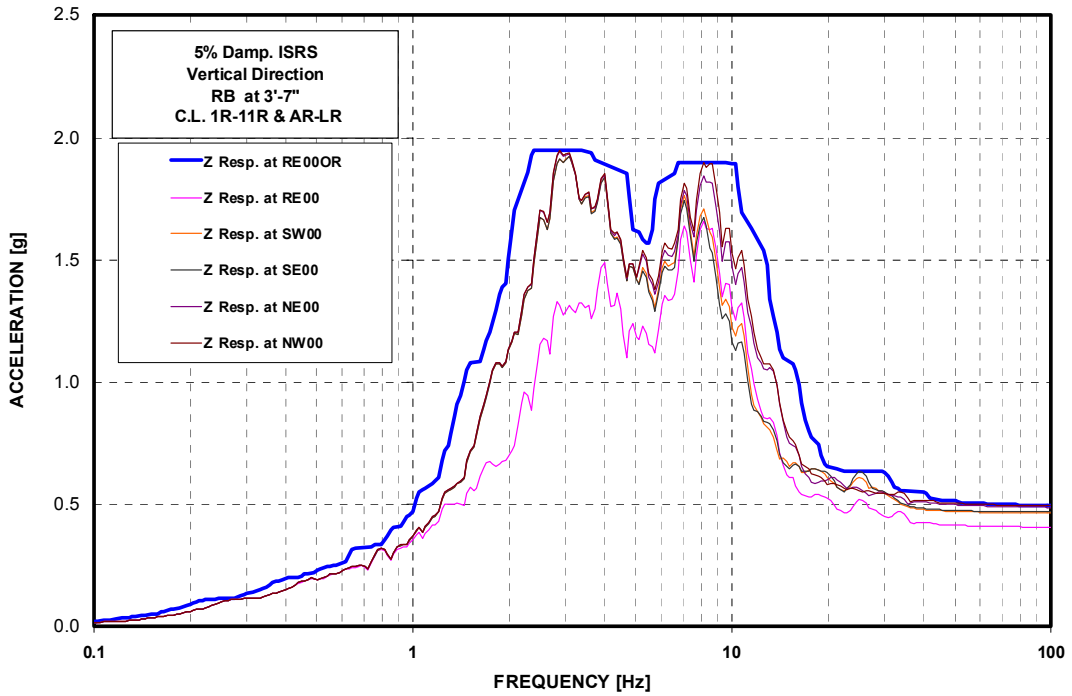


Figure 26 – RE00 ISRS Vertical Direction

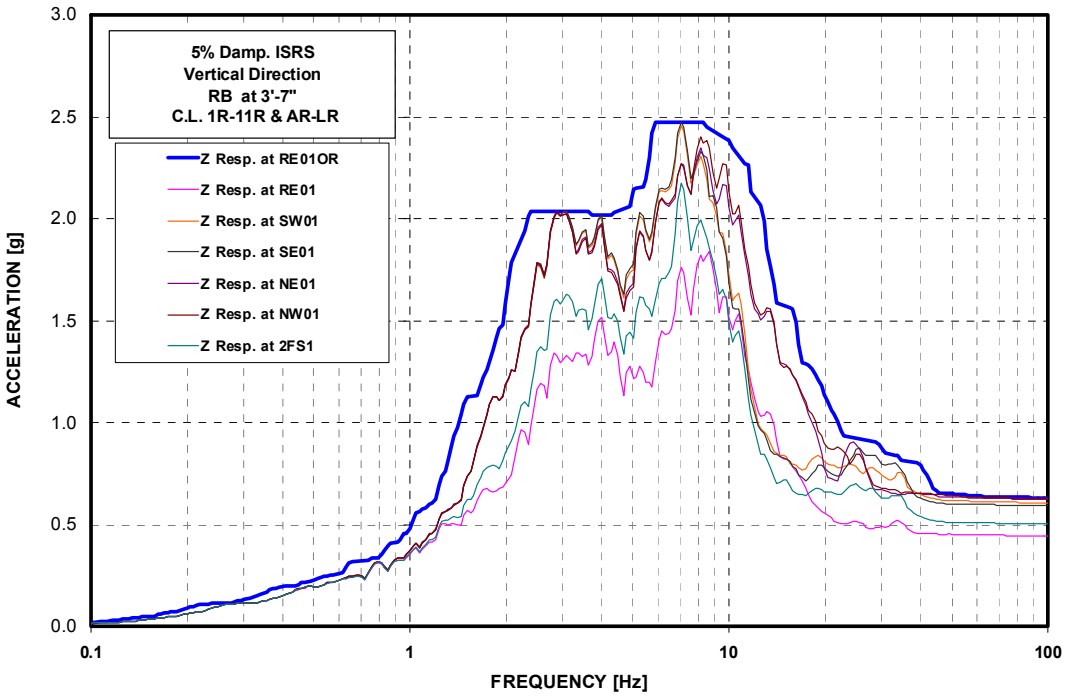


Figure 27 – RE01 ISRS Vertical Direction

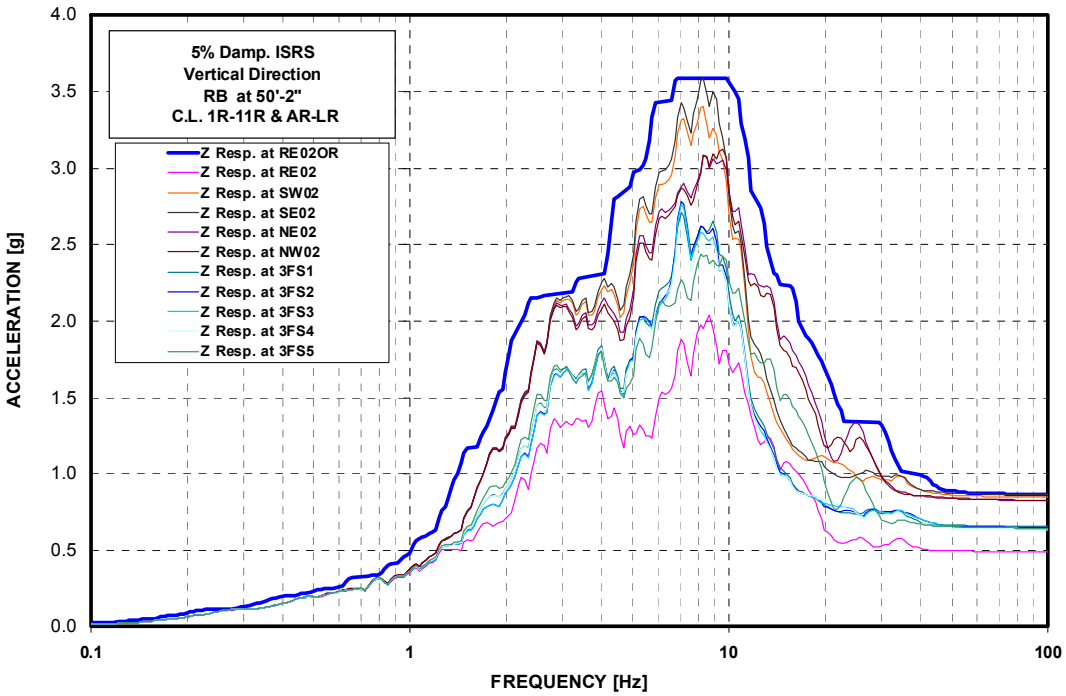


Figure 28 – RE02 ISRS Vertical Direction

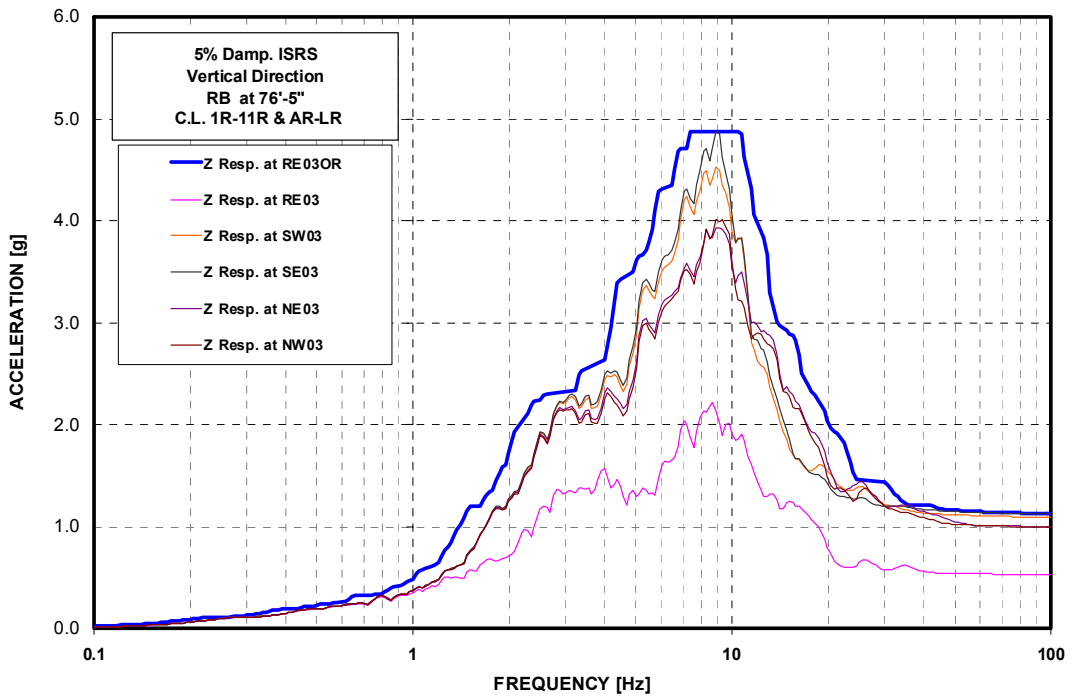


Figure 29 – RE03 ISRS Vertical Direction

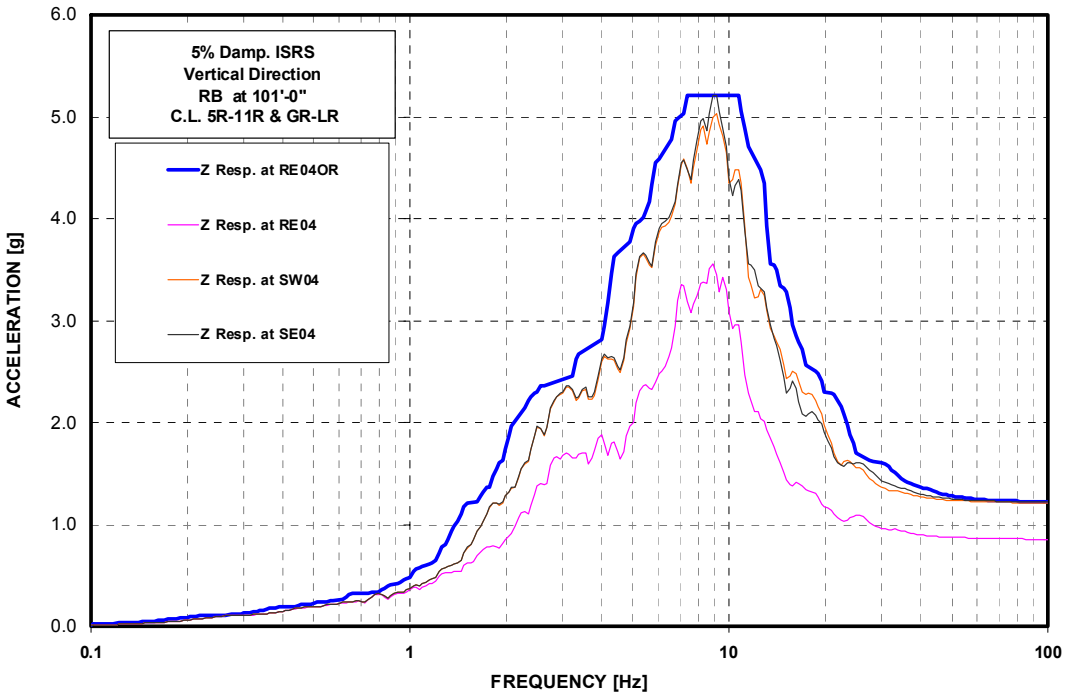


Figure 30 – RE04 ISRS Vertical Direction

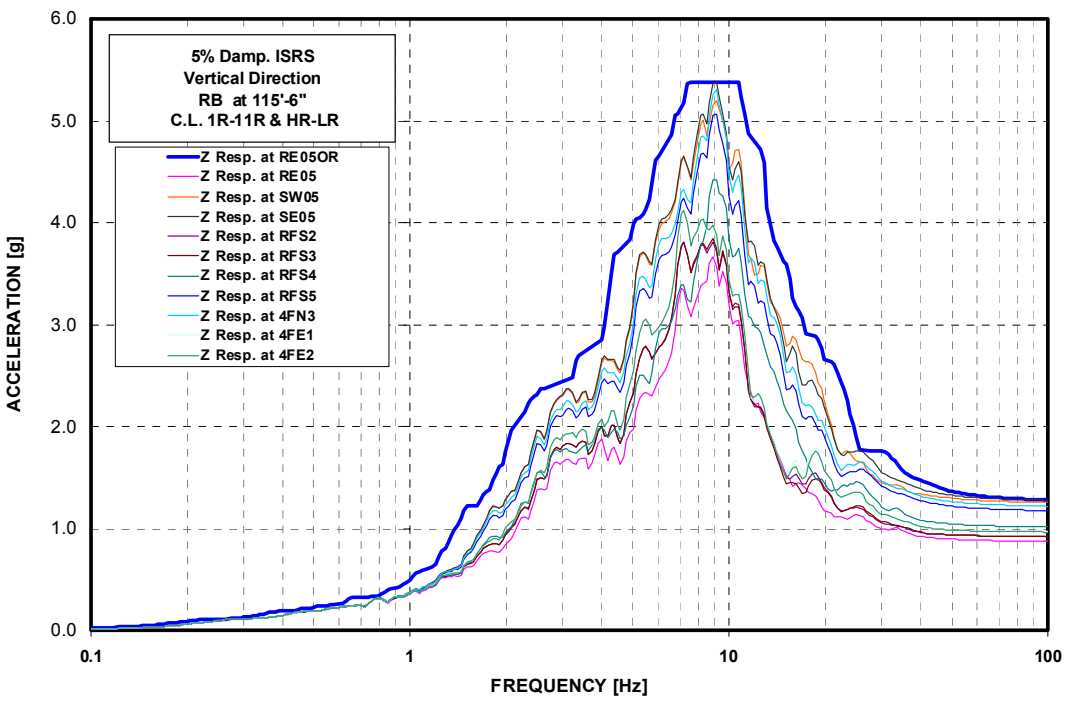


Figure 31 – RE05 ISRS Vertical Direction

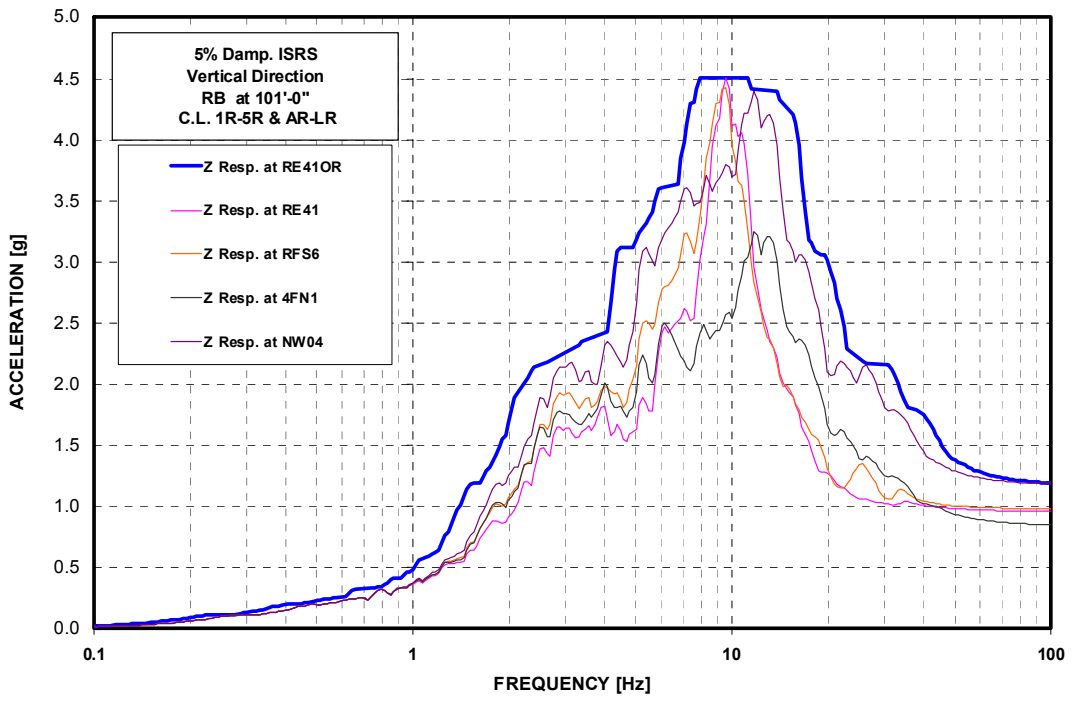


Figure 32 – RE41 ISRS Vertical Direction

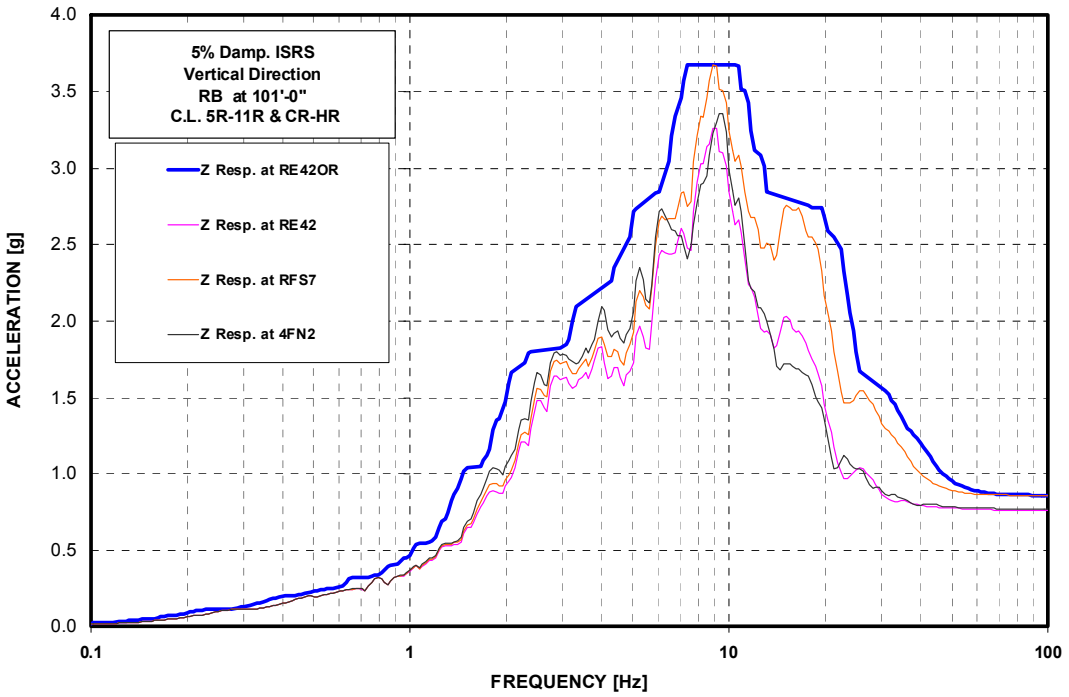


Figure 33 – RE42 ISRS Vertical Direction

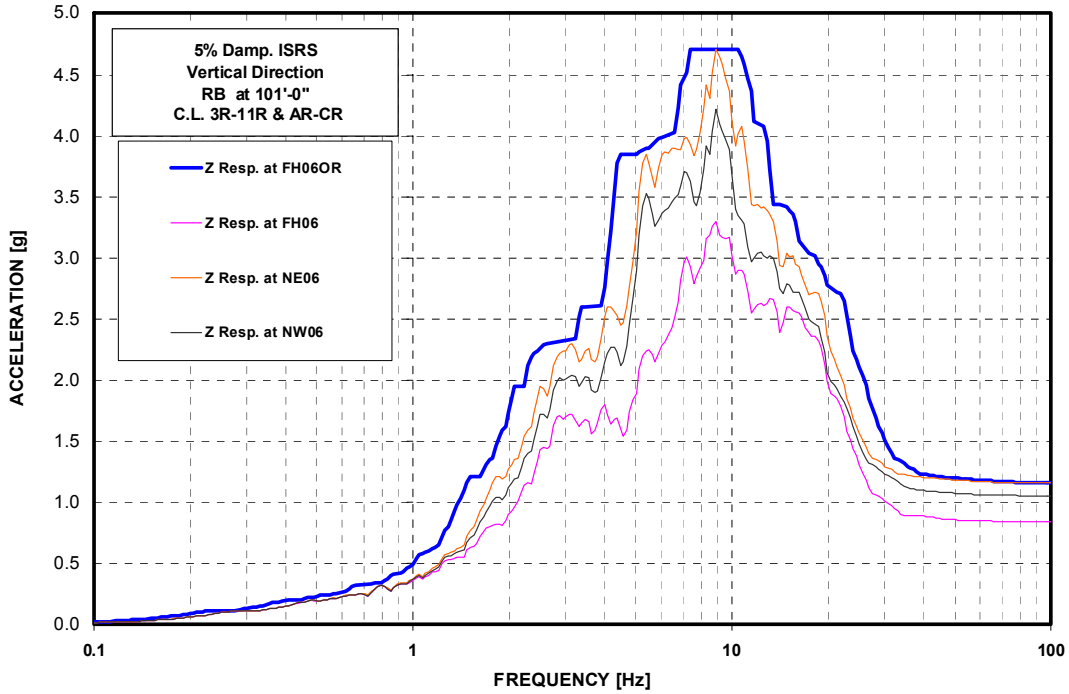


Figure 34 – FH06 ISRS Vertical Direction

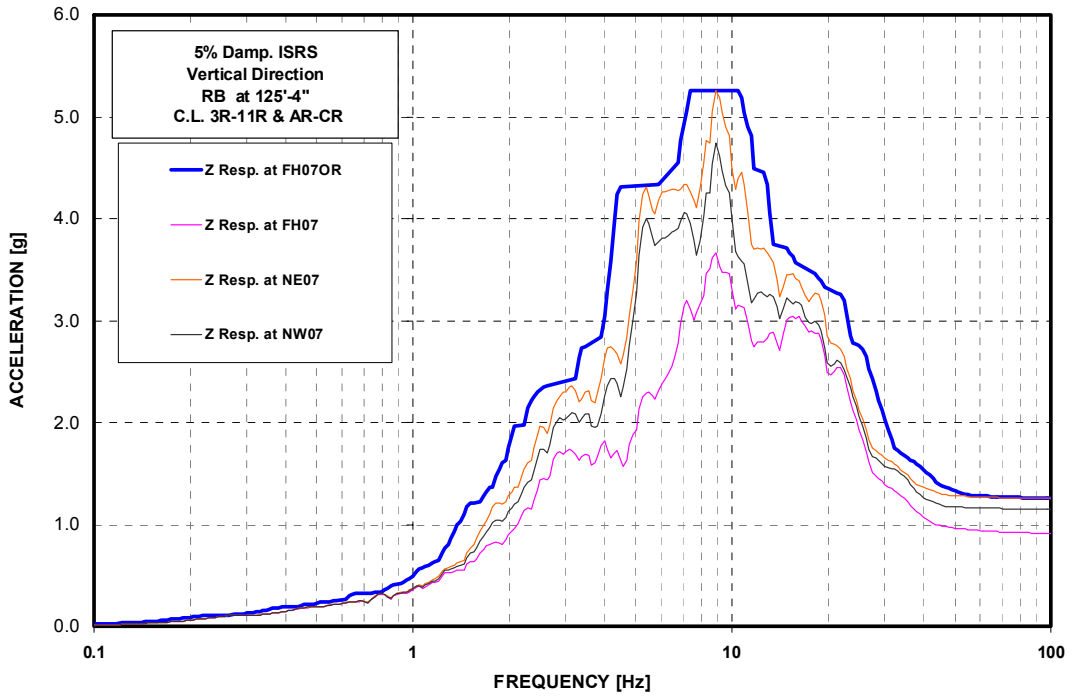


Figure 35 – FH07 ISRS Vertical Direction

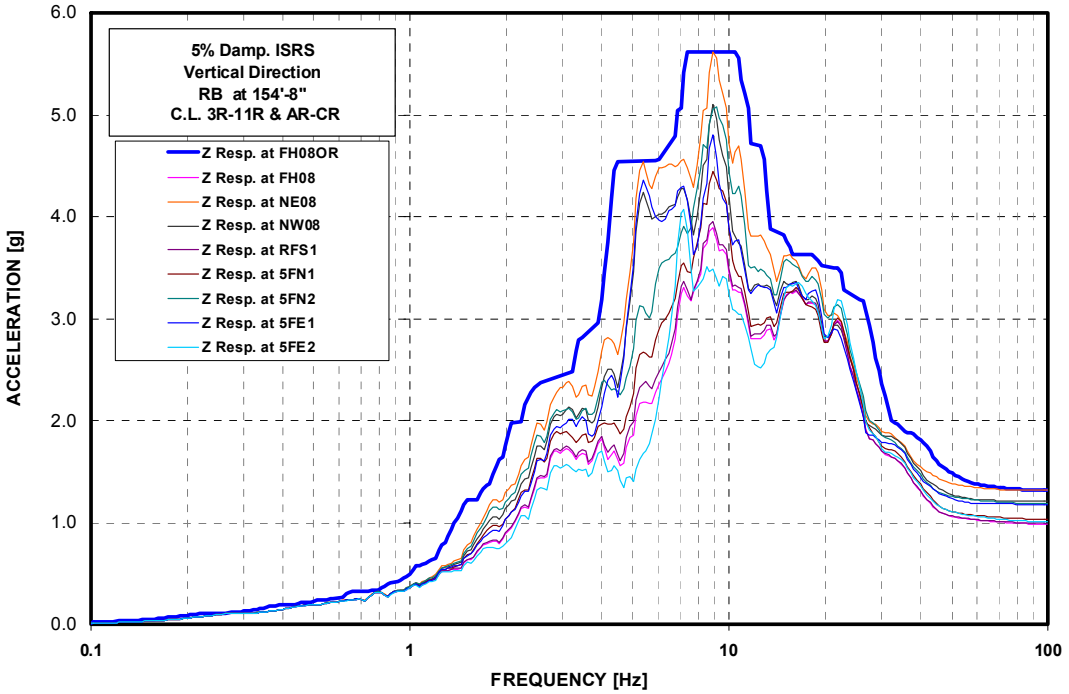


Figure 36 – FH08 ISRS Vertical Direction

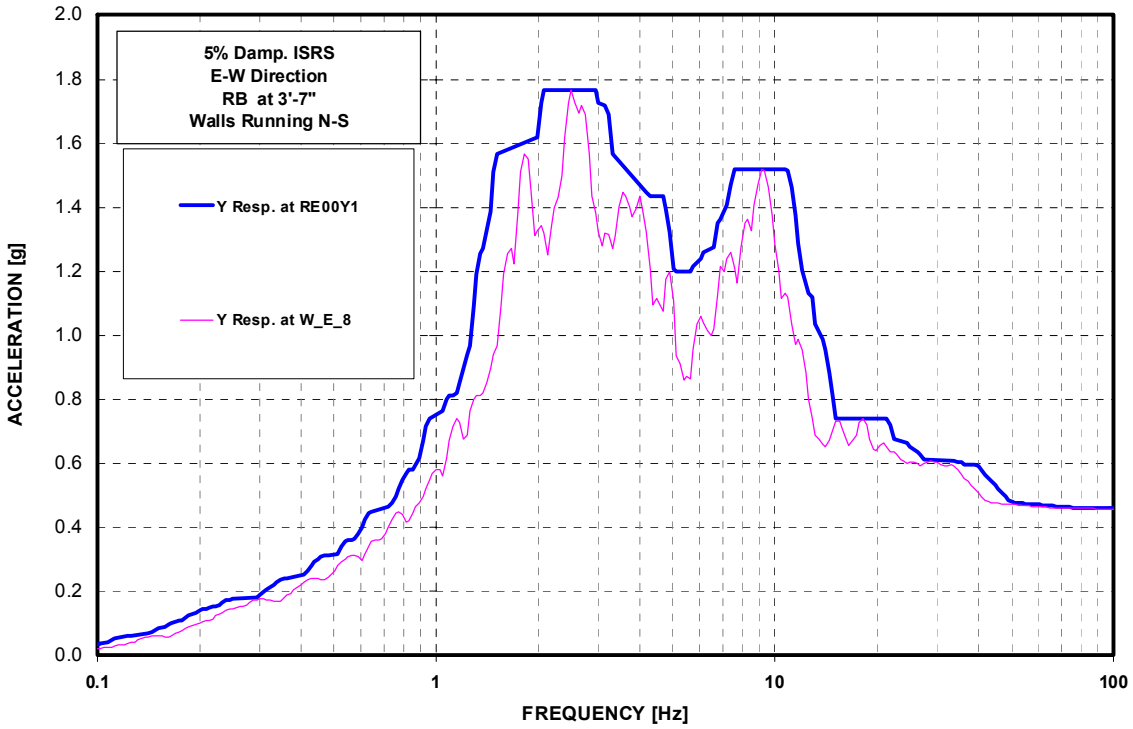


Figure 37 – RE00Y1 ISRS SDOF N-S Direction

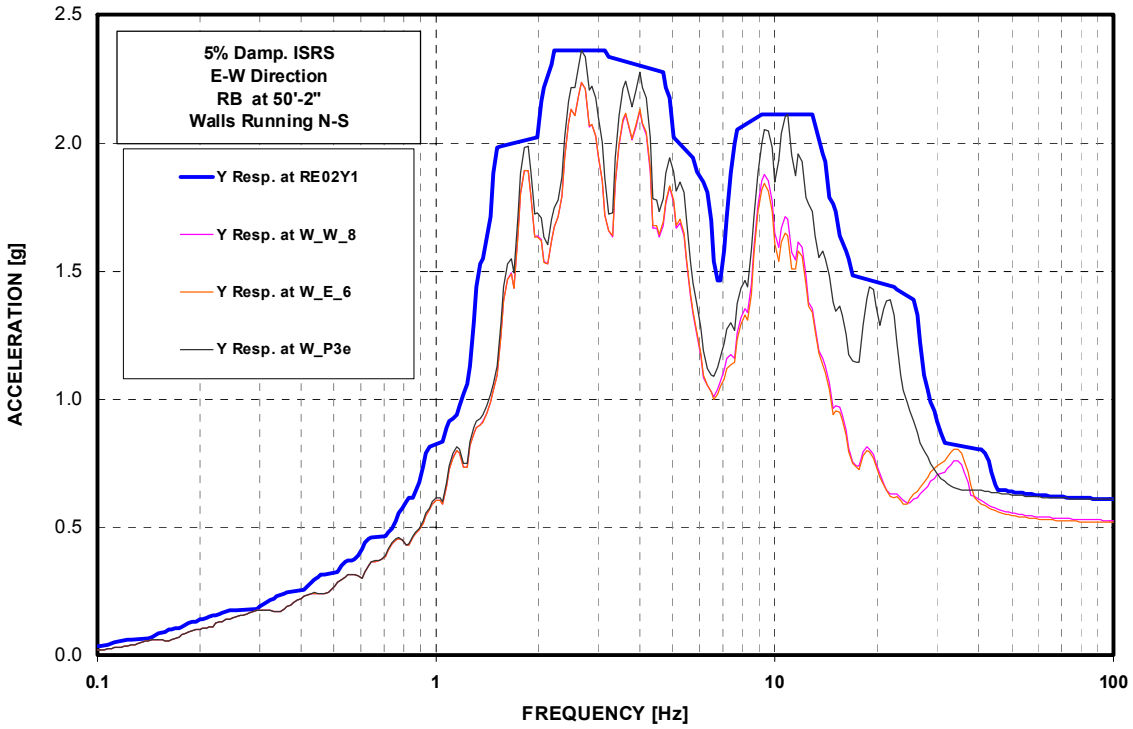


Figure 38 – RE02Y1 ISRS SDOF N-S Direction

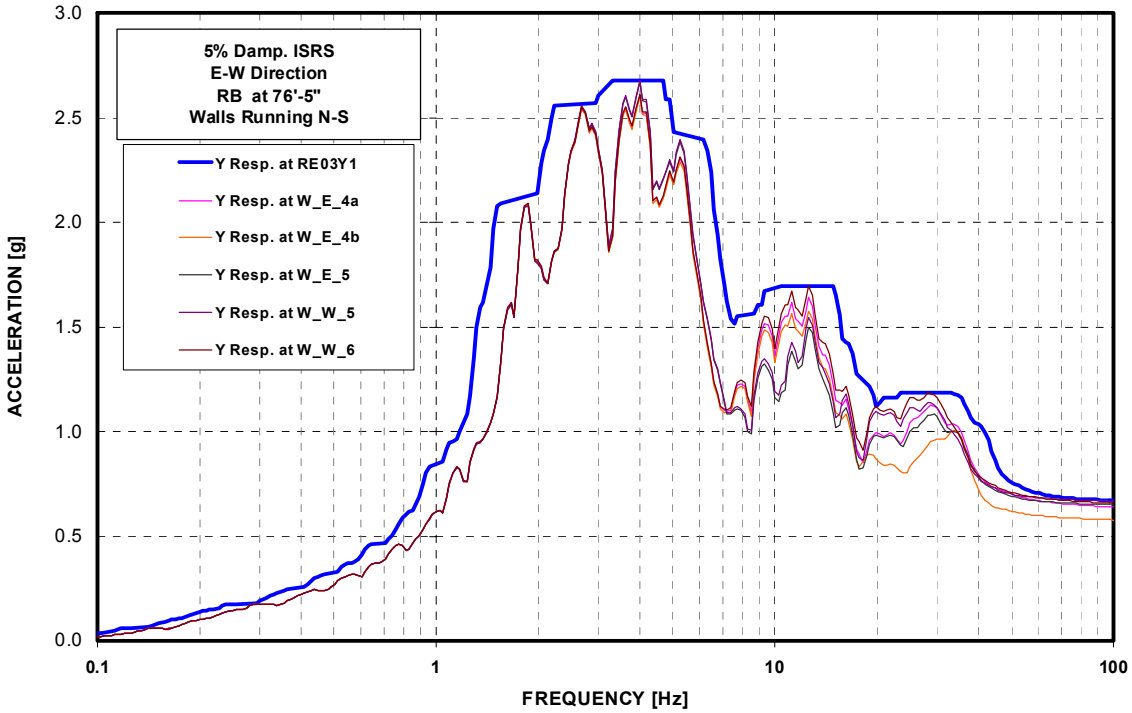


Figure 39 – RE03Y1 ISRS SDOF N-S Direction

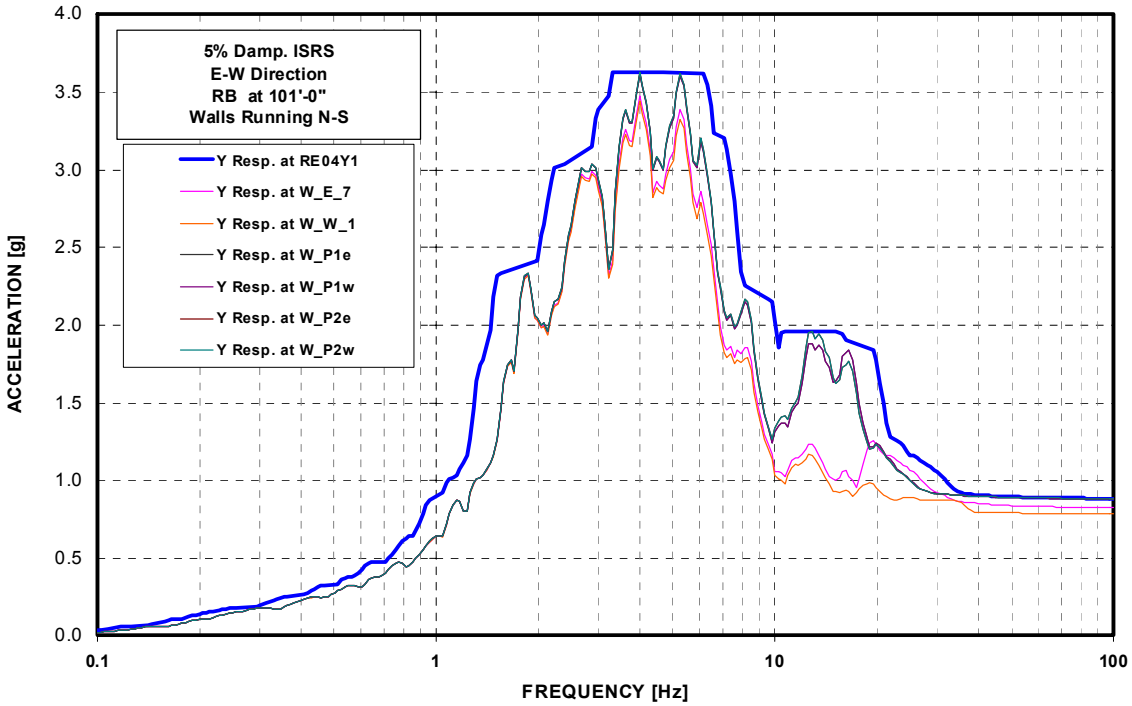


Figure 40 – RE04Y1 ISRS SDOF N-S Direction

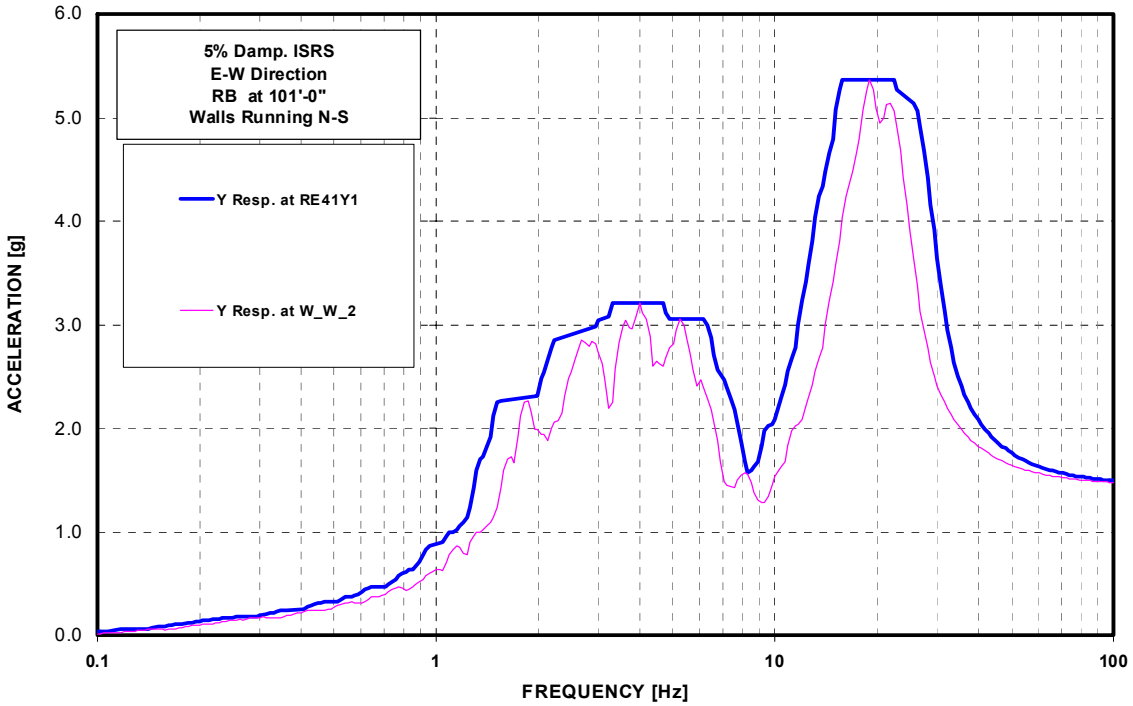


Figure 41 – RE41Y1 ISRS SDOF N-S Direction

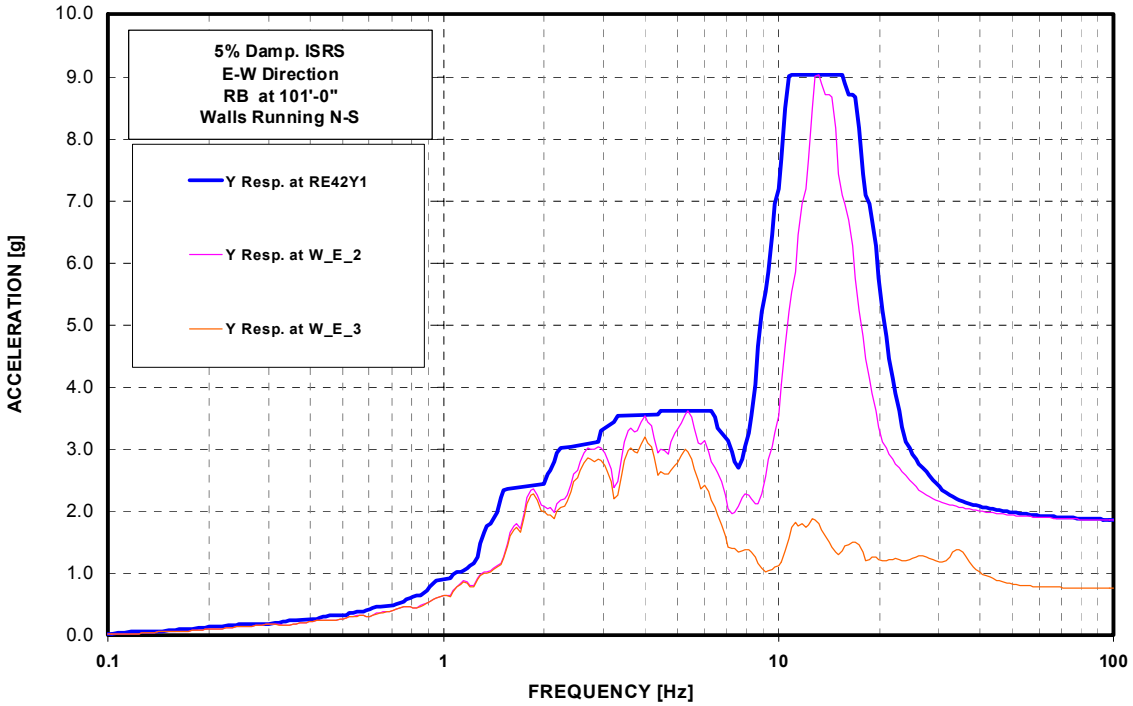


Figure 42 – RE42Y1 ISRS SDOF N-S Direction

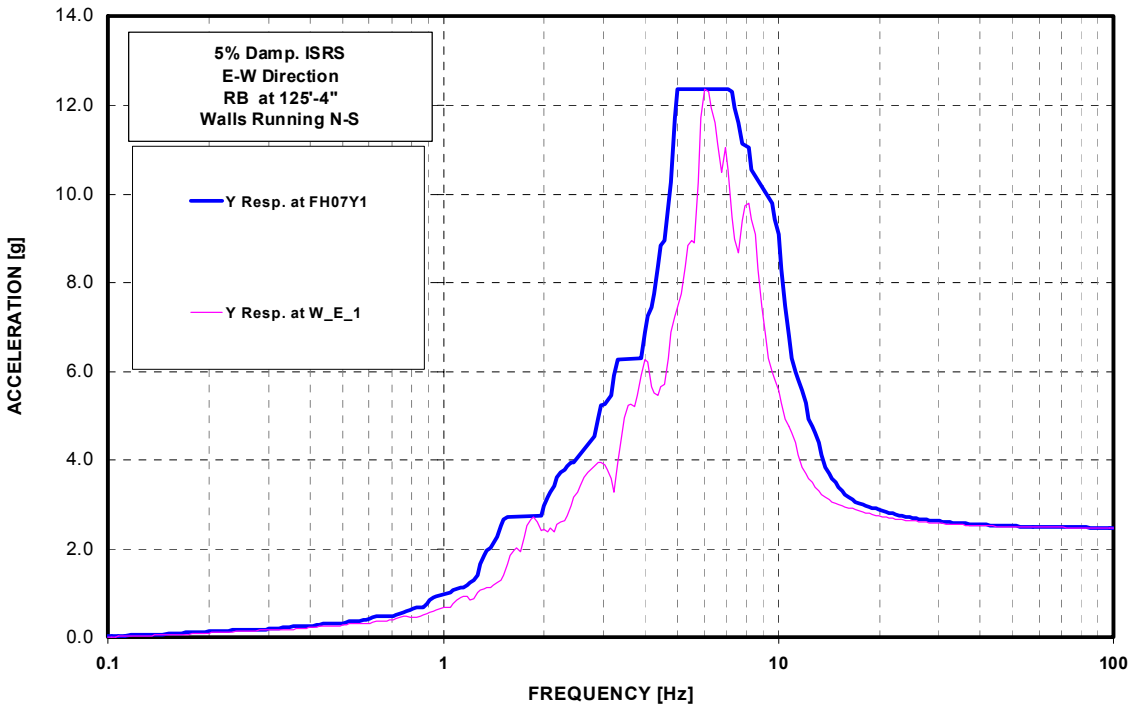


Figure 43 – FH07Y1 ISRS SDOF N-S Direction

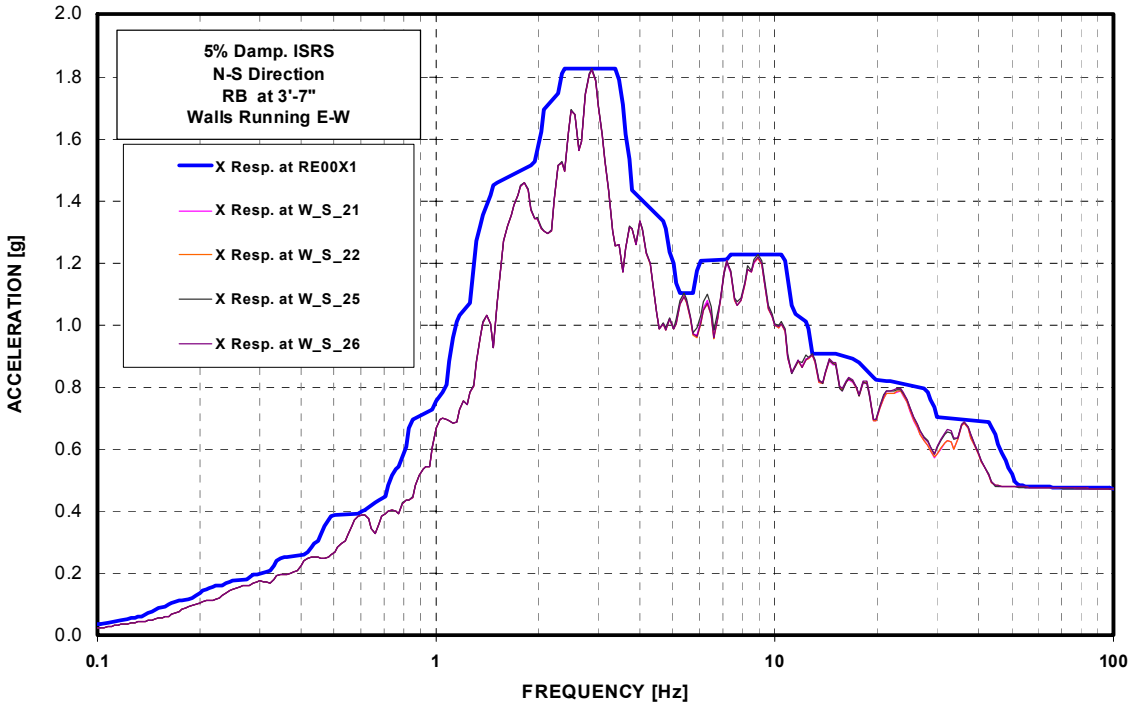


Figure 44 – RE00X1 ISRS SDOF E-W Direction

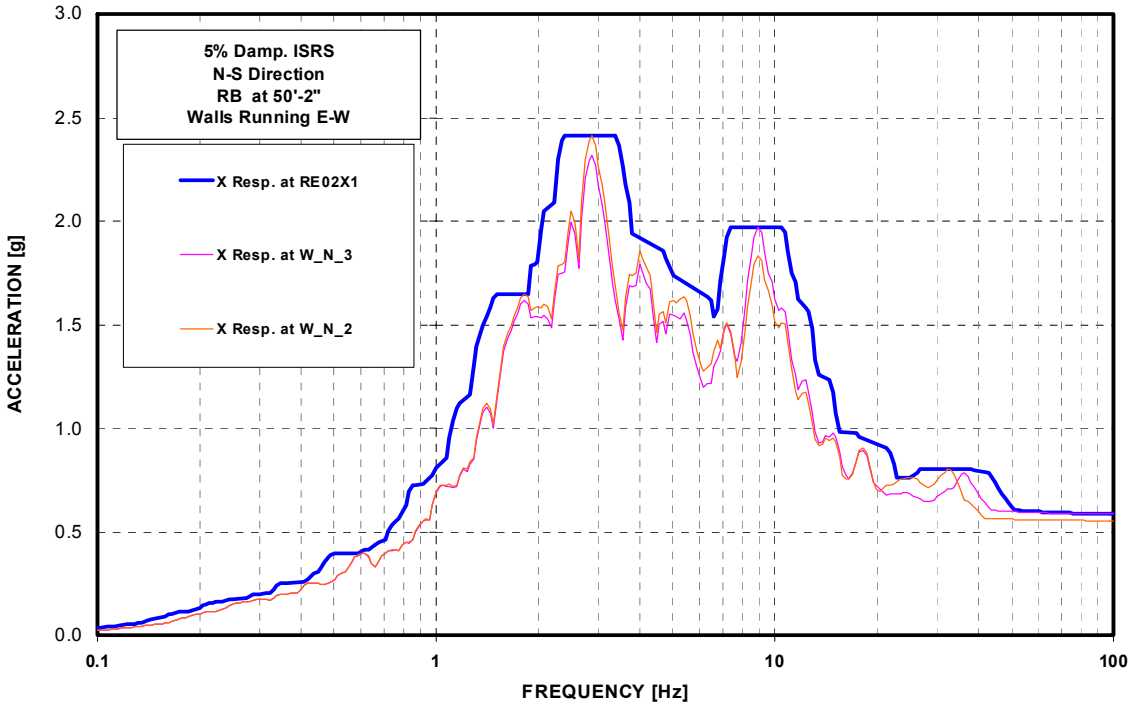


Figure 45 – RE02X1 ISRS SDOF E-W Direction

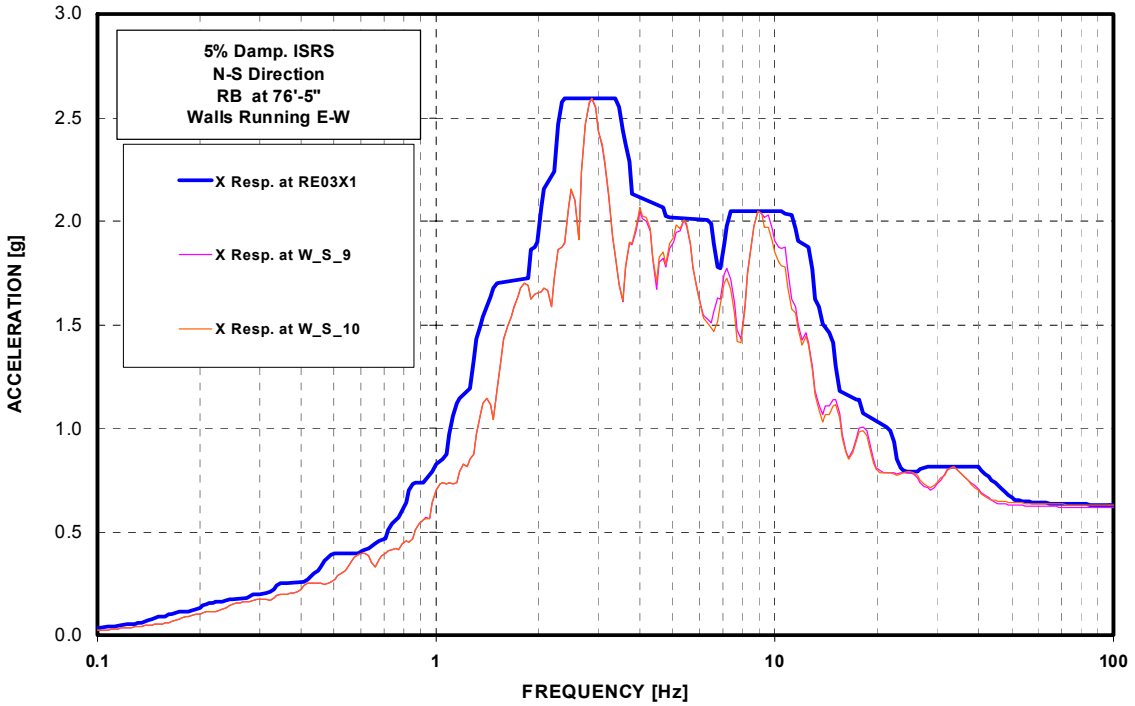


Figure 46 – RE03X1 ISRS SDOF E-W Direction

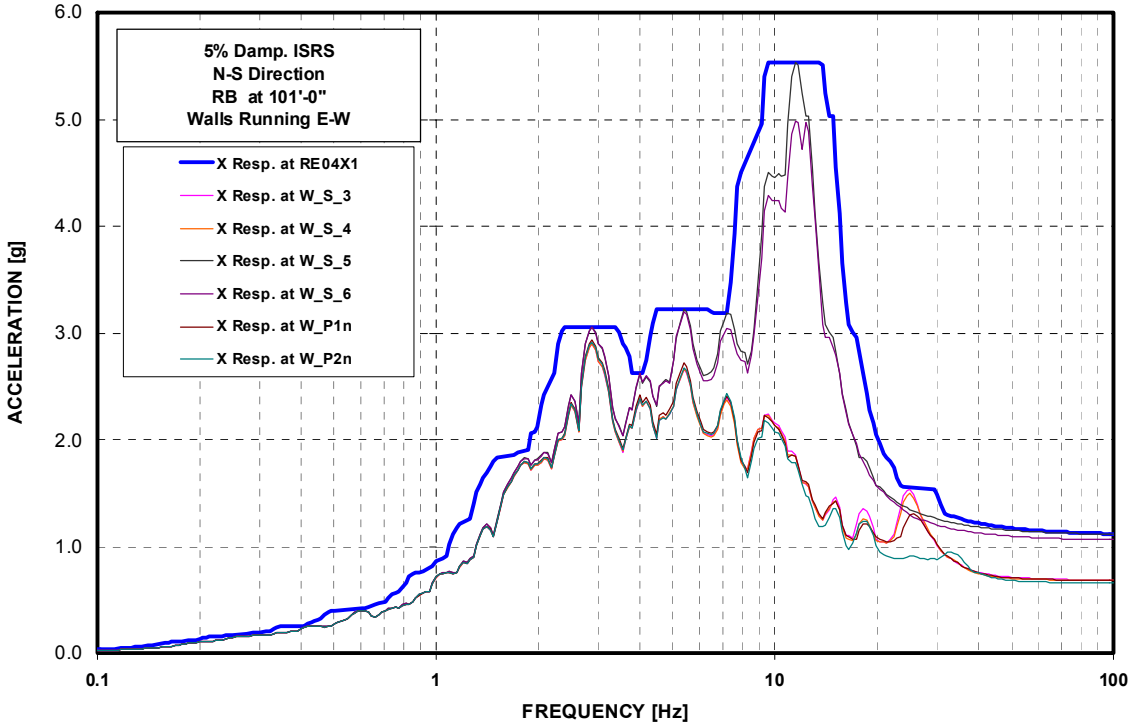


Figure 47 – RE04X1 ISRS SDOF E-W Direction

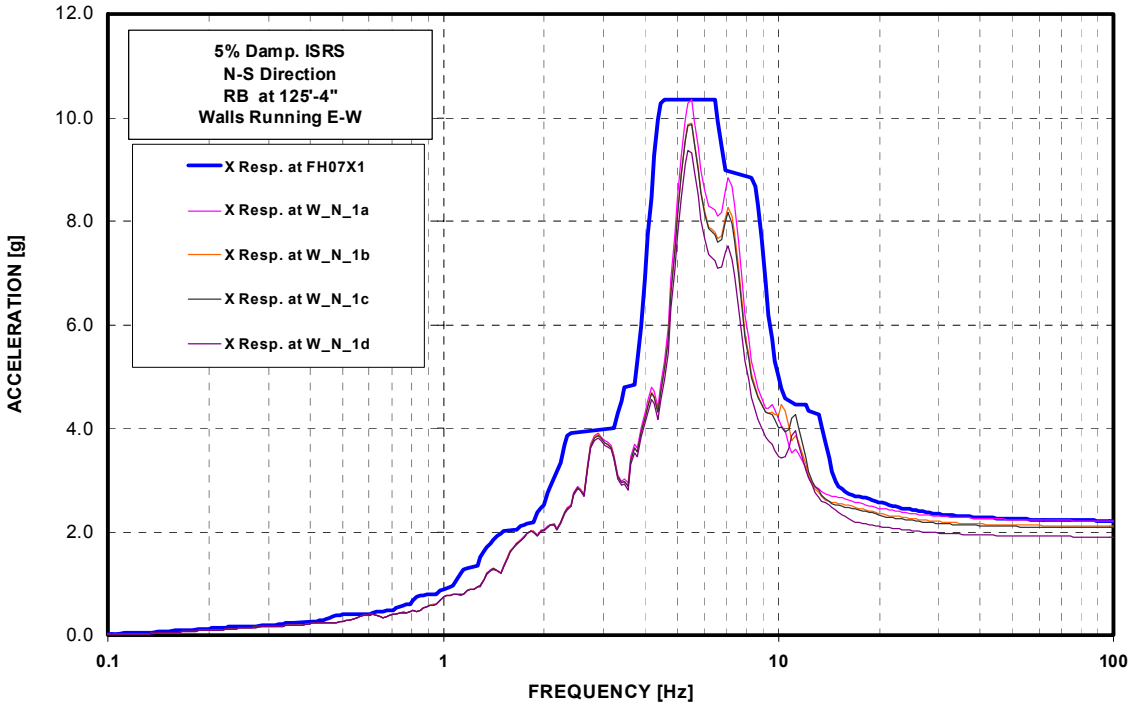


Figure 48 – FH07X1 ISRS SDOF E-W Direction

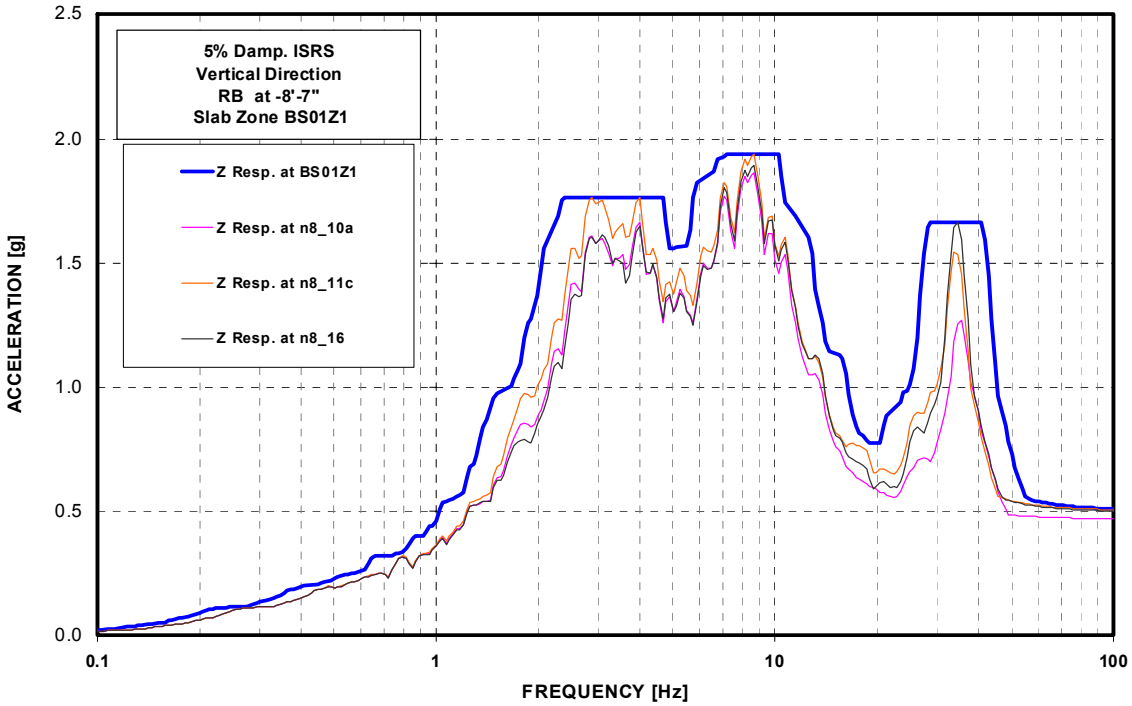


Figure 49 – BS01Z1 ISRS SDOF Vertical Direction

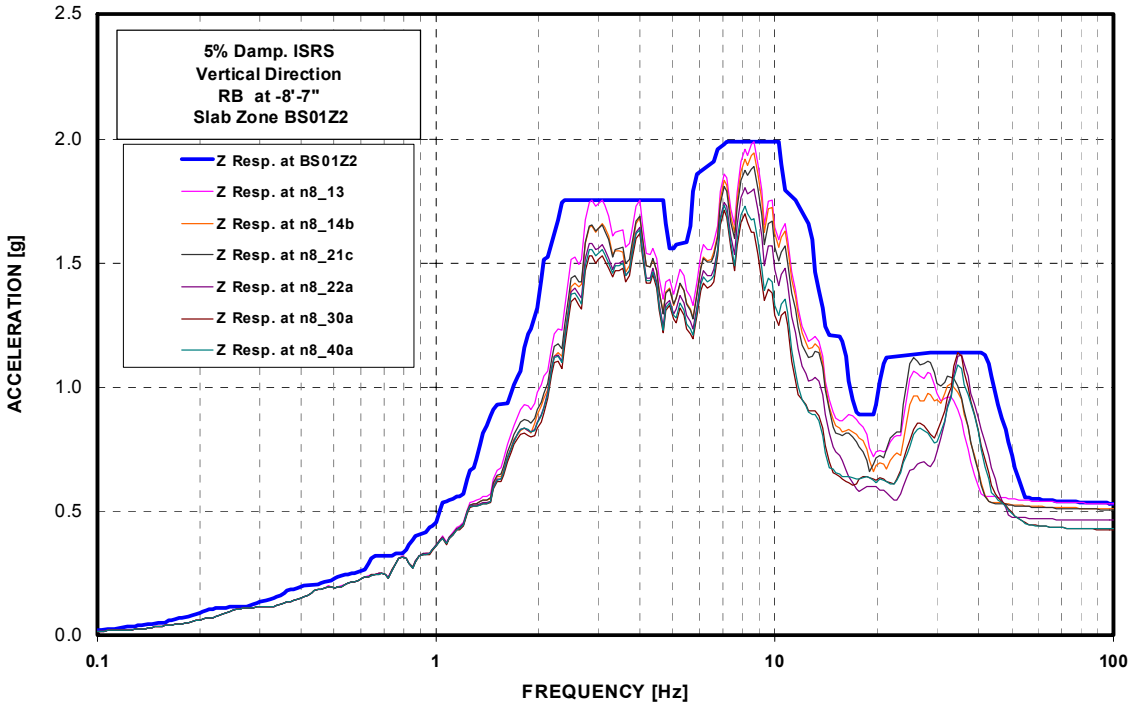


Figure 50 – BS01Z2 ISRS SDOF Vertical Direction

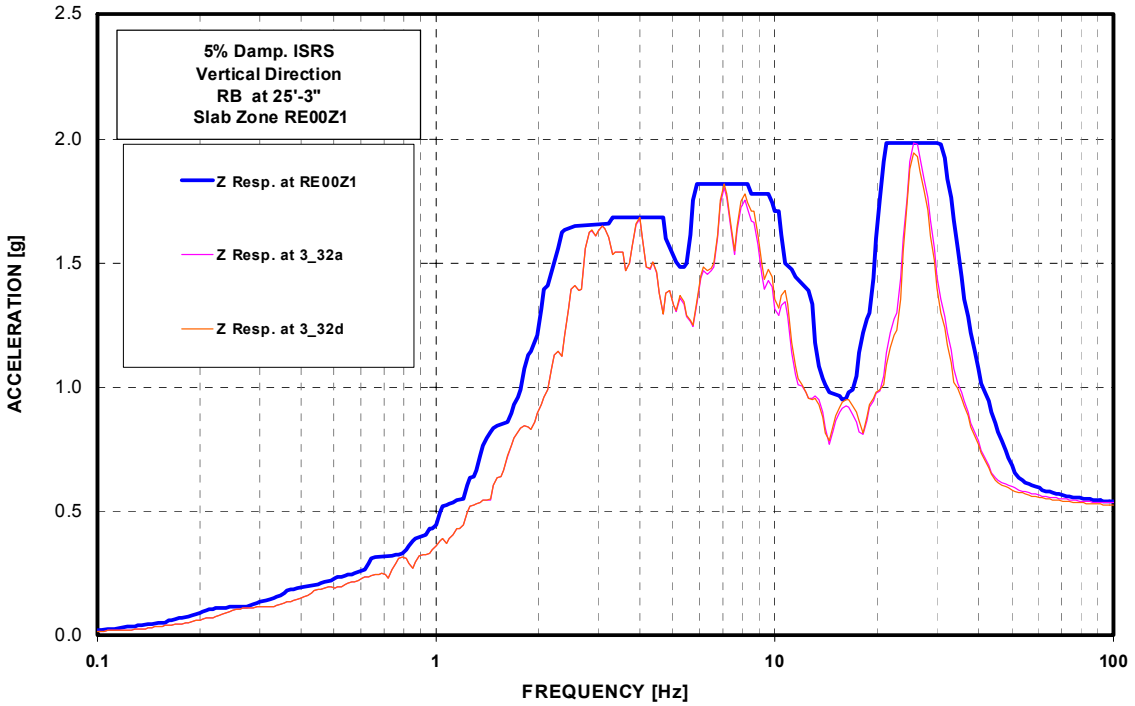


Figure 51 – RE00Z1 ISRS SDOF Vertical Direction

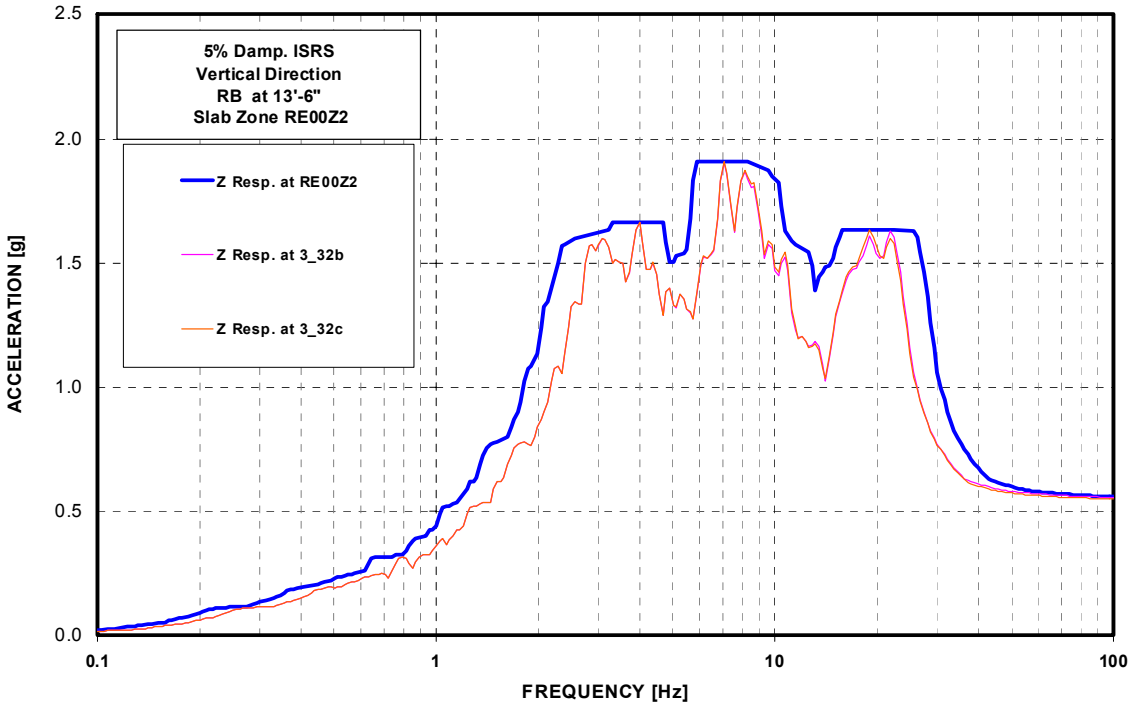


Figure 52 – RE00Z2 ISRS SDOF Vertical Direction

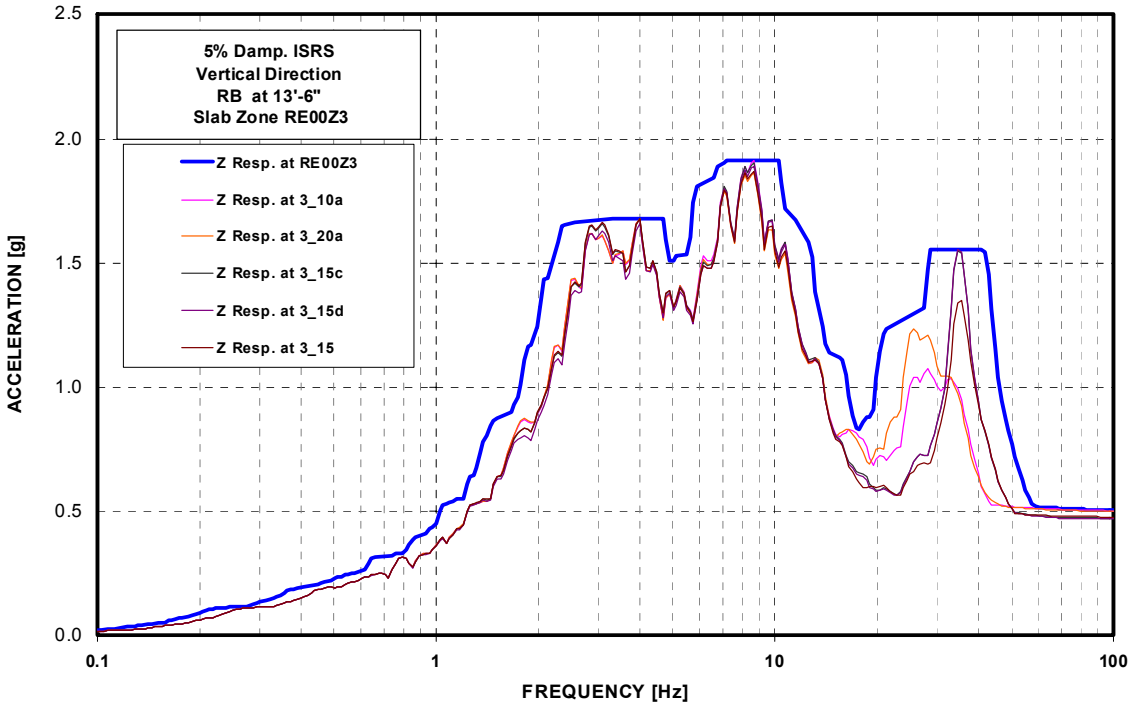


Figure 53 – RE00Z3 ISRS SDOF Vertical Direction

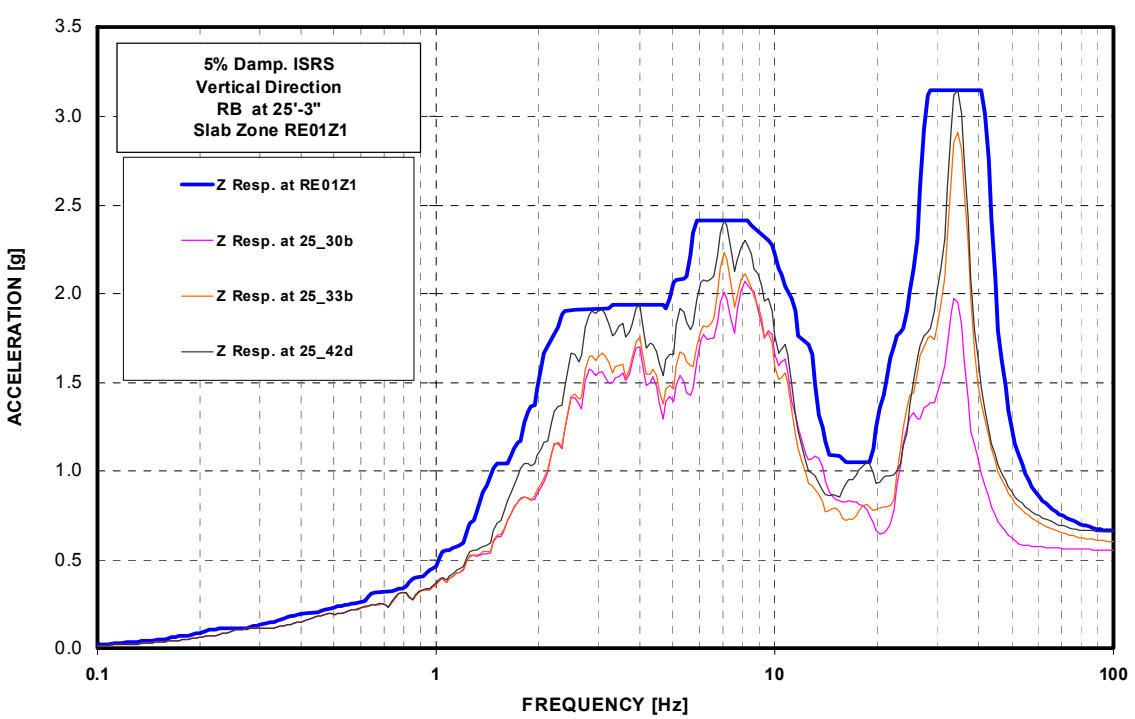


Figure 54 – RE01Z1 ISRS SDOF Vertical Direction

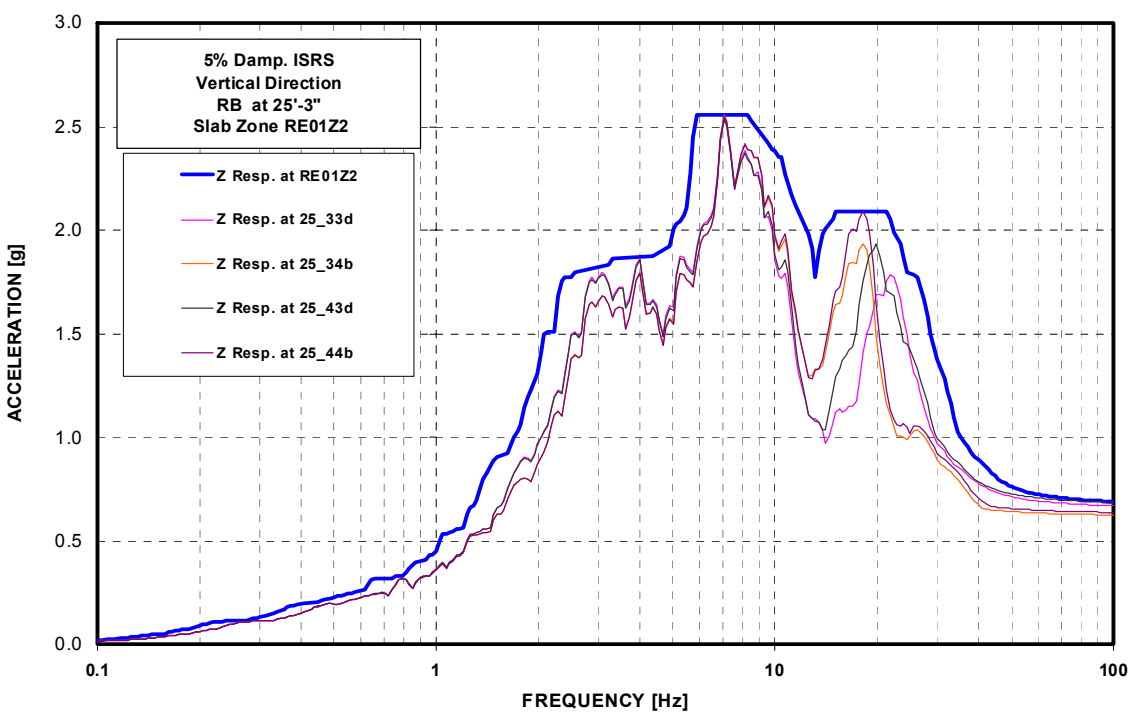


Figure 55 – RE01Z2 ISRS SDOF Vertical Direction

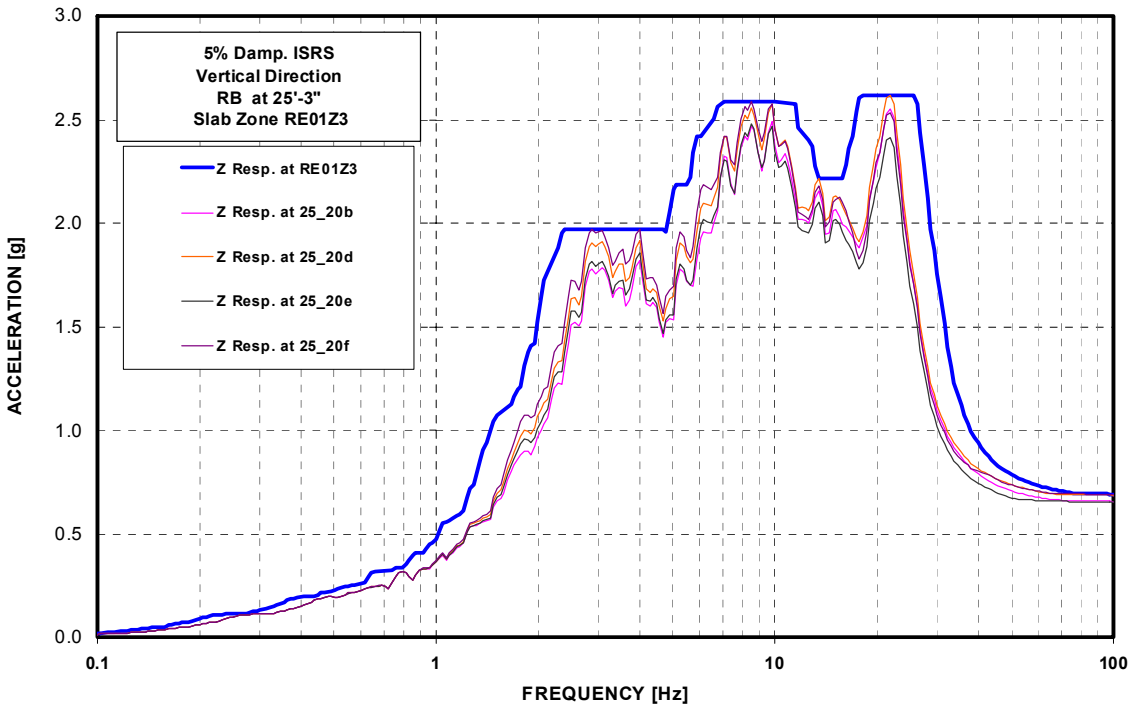


Figure 56 – RE01Z3 ISRS SDOF Vertical Direction

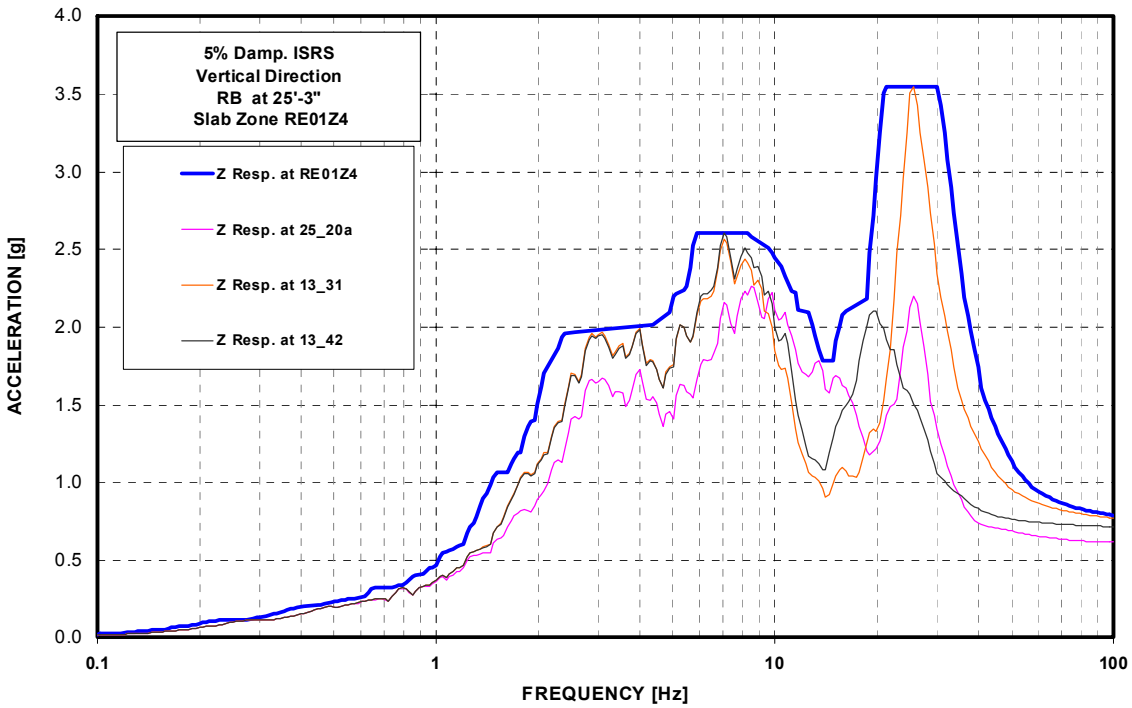


Figure 57 – RE01Z4 ISRS SDOF Vertical Direction

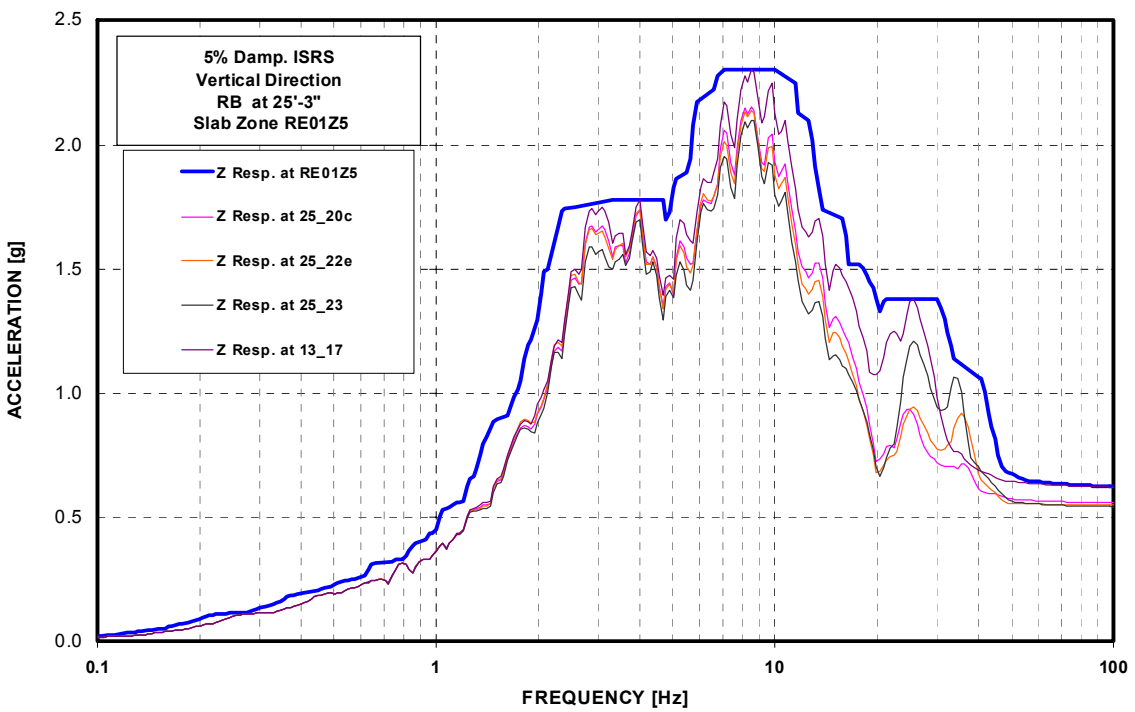


Figure 58 – RE01Z5 ISRS SDOF Vertical Direction

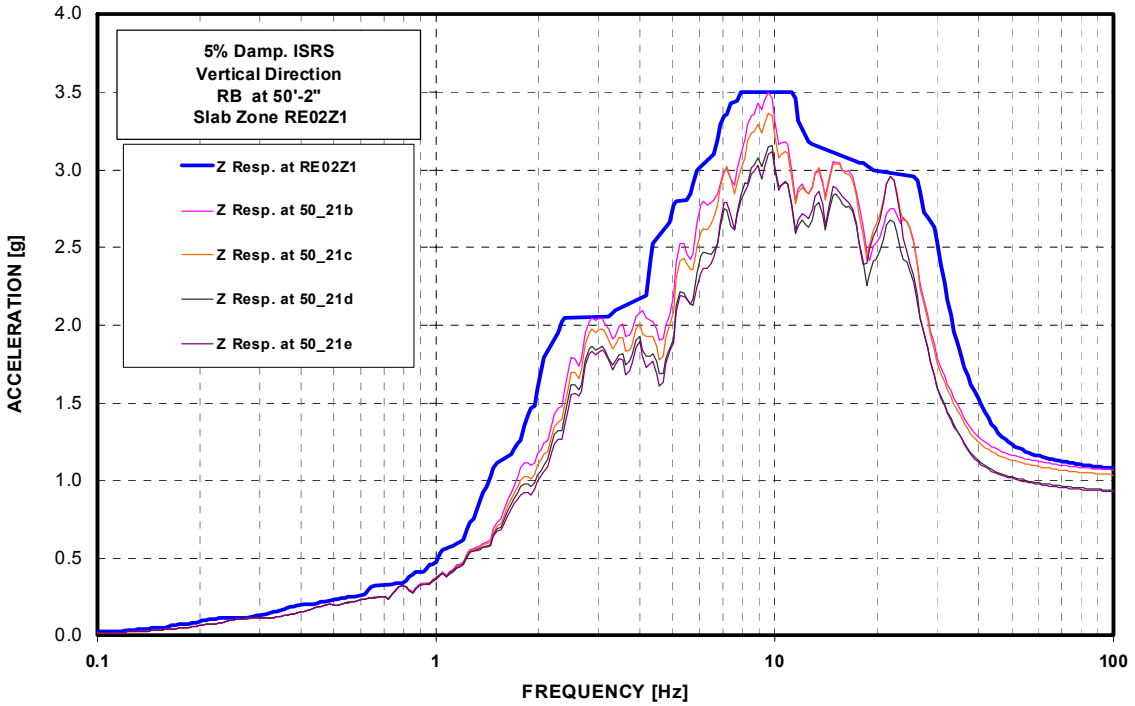


Figure 59 – RE02Z1 ISRS SDOF Vertical Direction

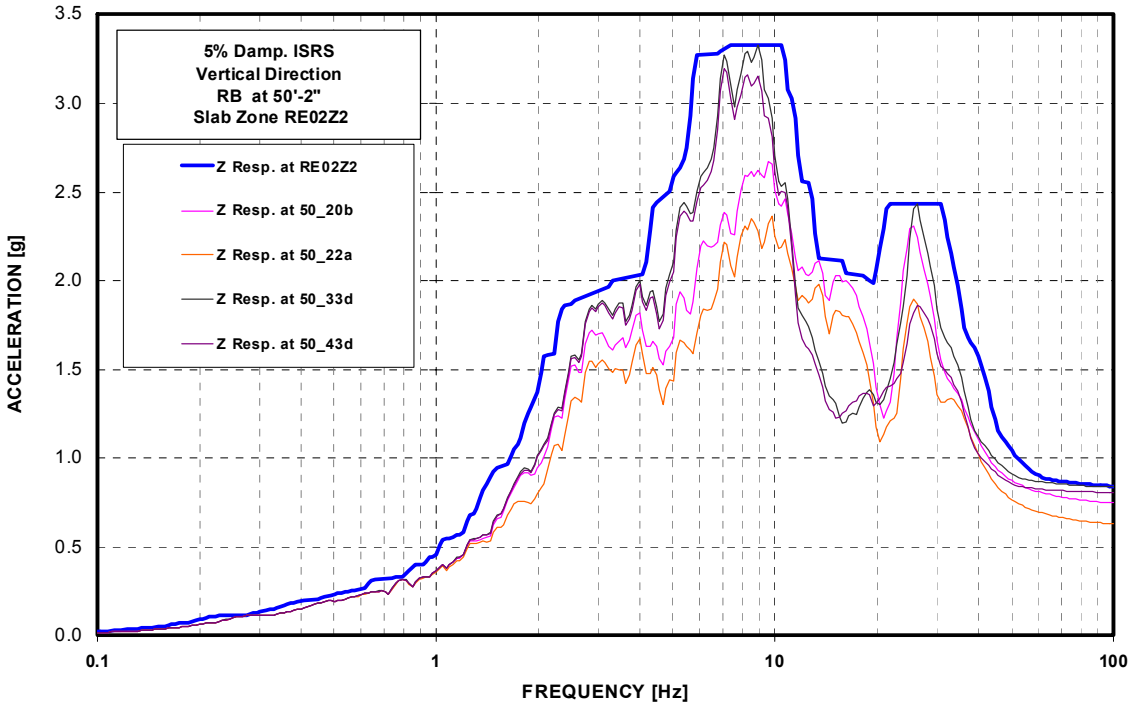


Figure 60 – RE02Z2 ISRS SDOF Vertical Direction

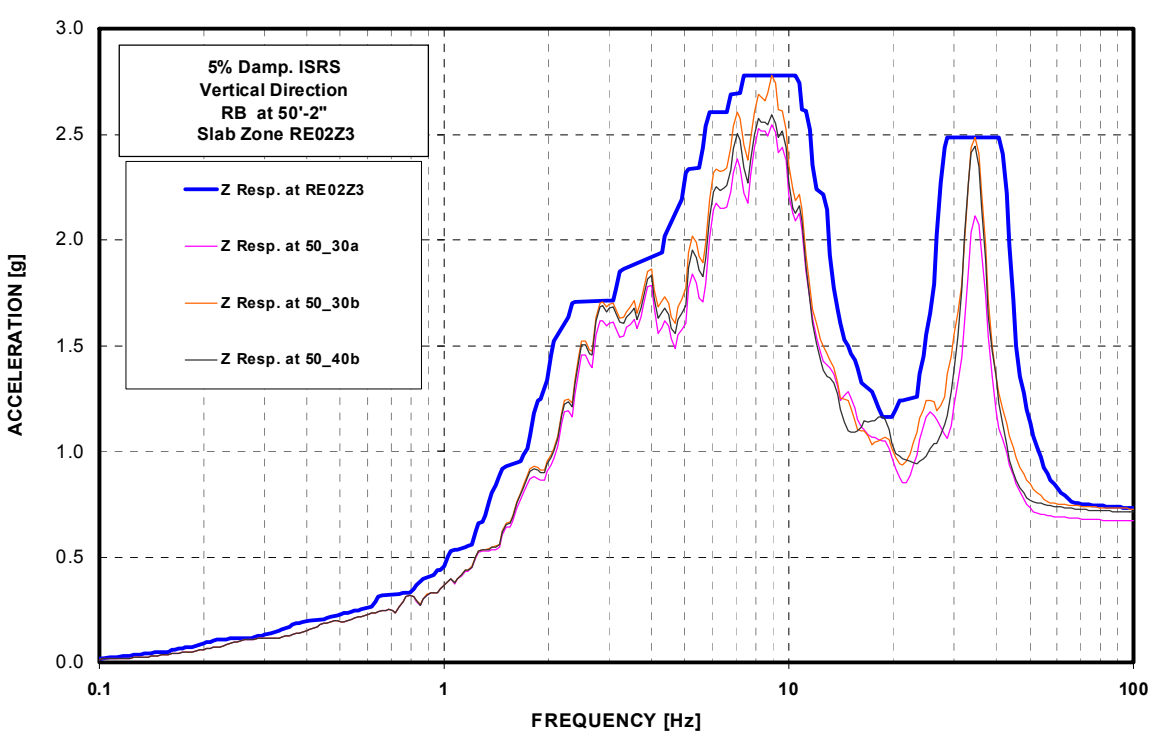


Figure 61 – RE02Z3 ISRS SDOF Vertical Direction

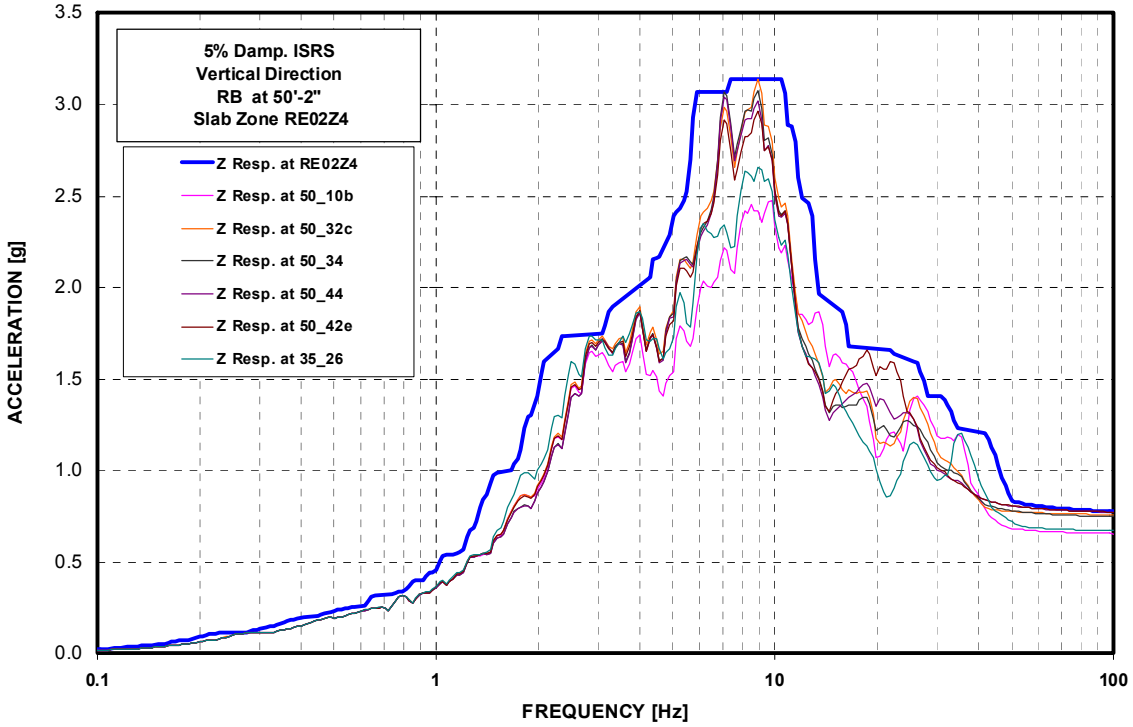


Figure 62 – RE02Z4 ISRS SDOF Vertical Direction

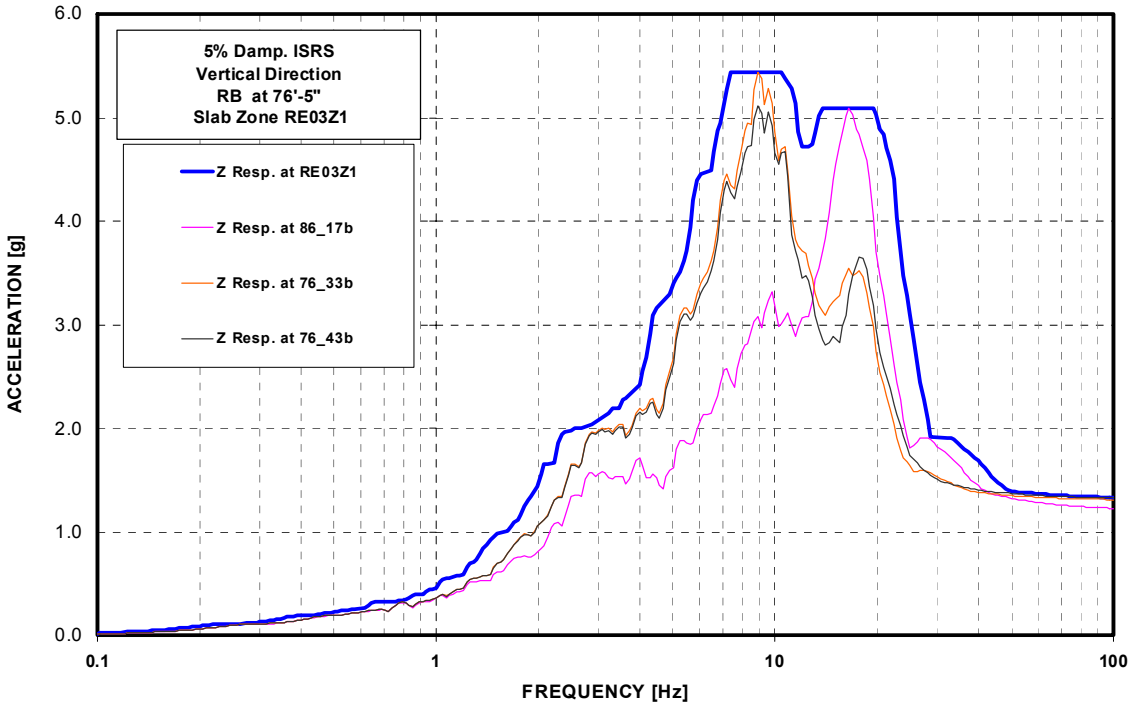


Figure 63 – RE03Z1 ISRS SDOF Vertical Direction

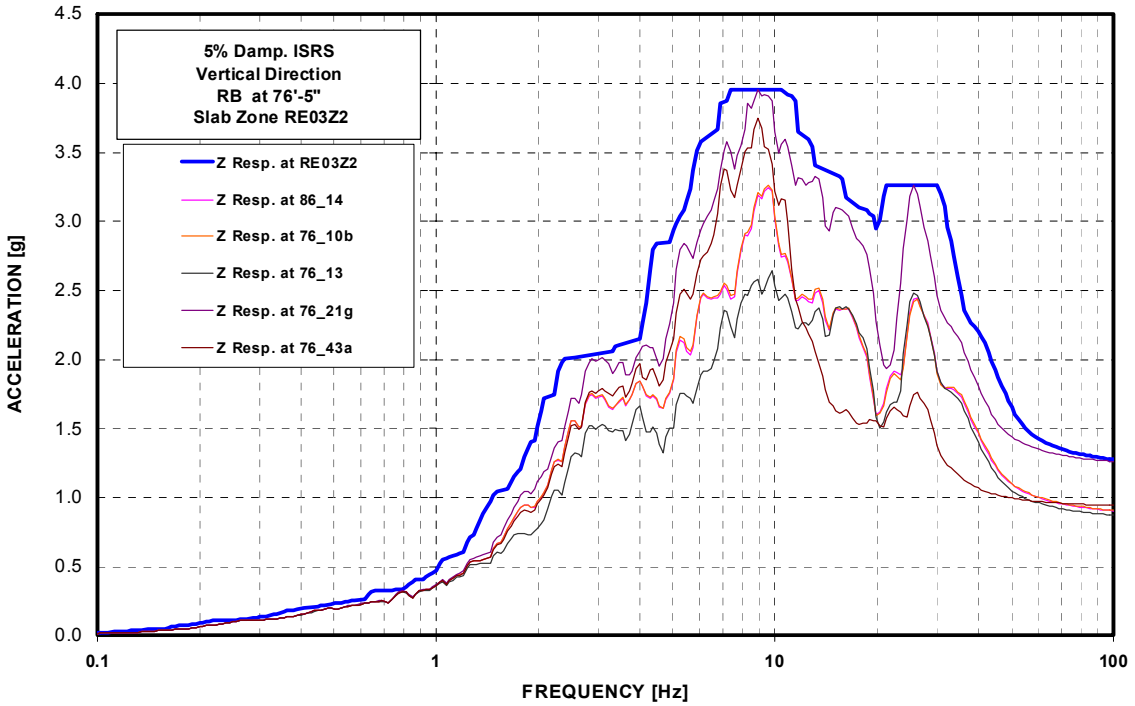


Figure 64 – RE03Z2 ISRS SDOF Vertical Direction

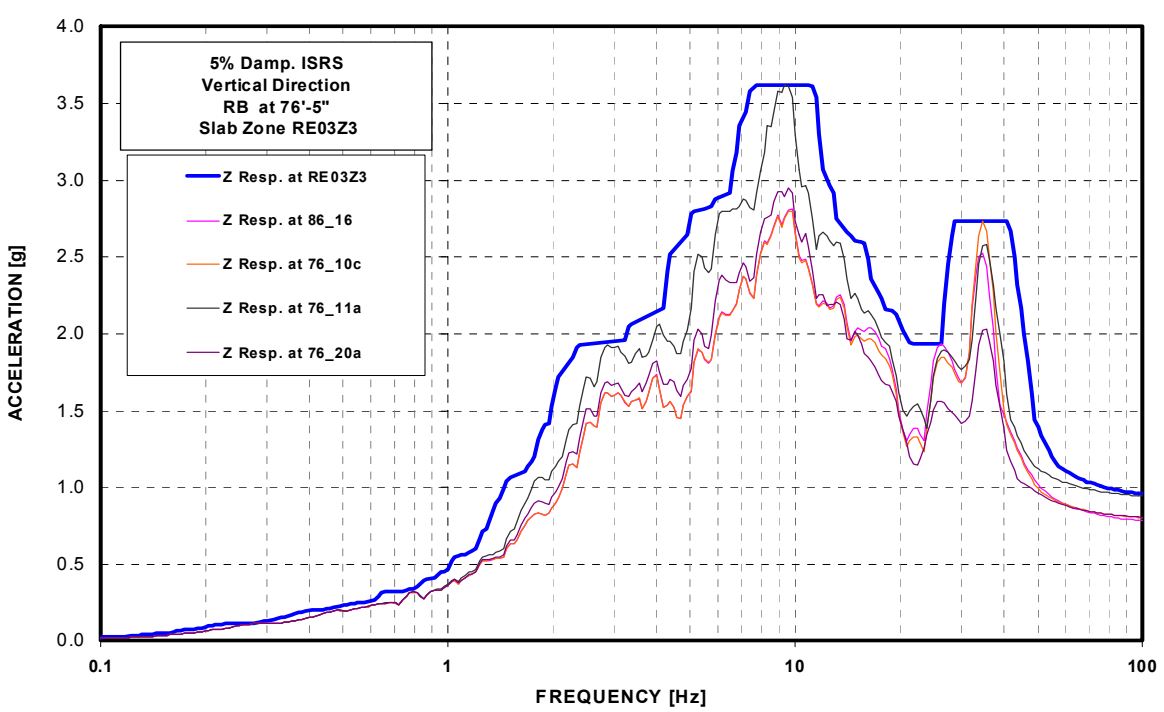


Figure 65 – RE03Z3 ISRS SDOF Vertical Direction

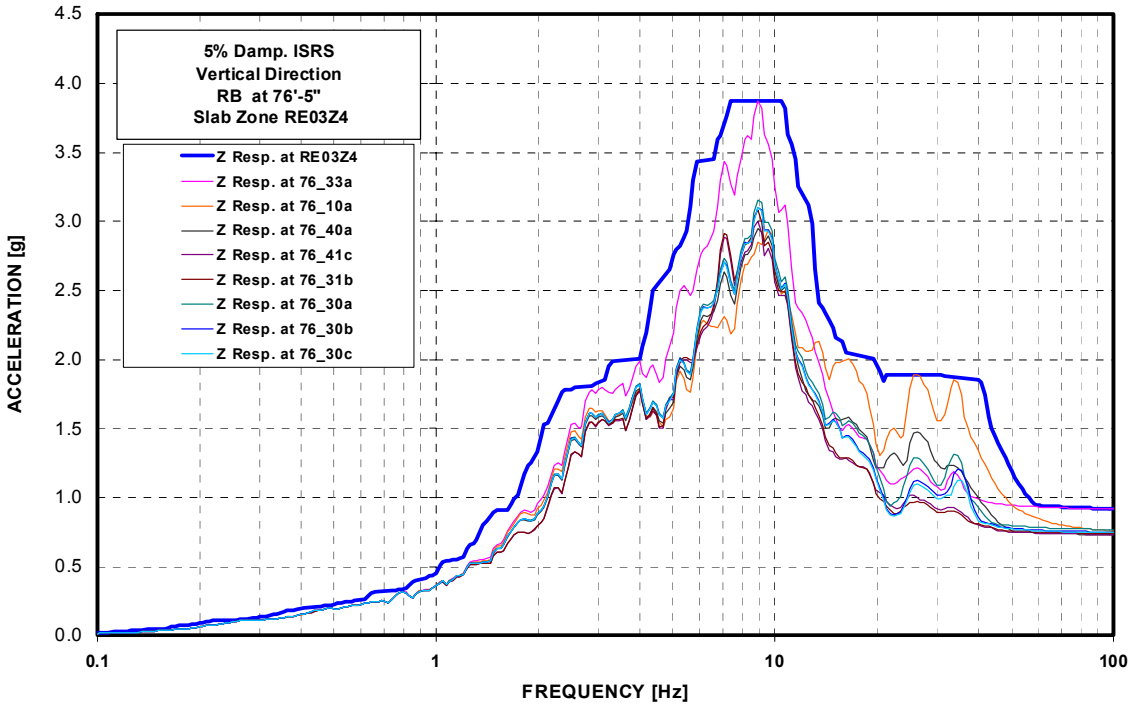


Figure 66 – RE03Z4 ISRS SDOF Vertical Direction

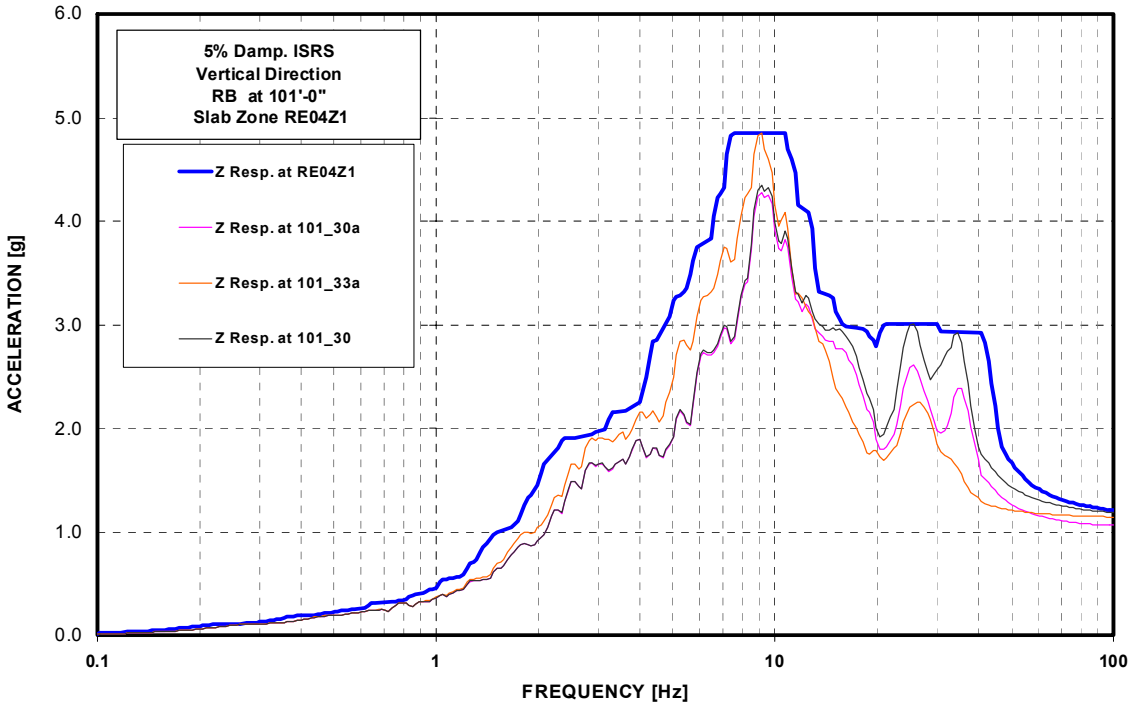


Figure 67 – RE04Z1 ISRS SDOF Vertical Direction

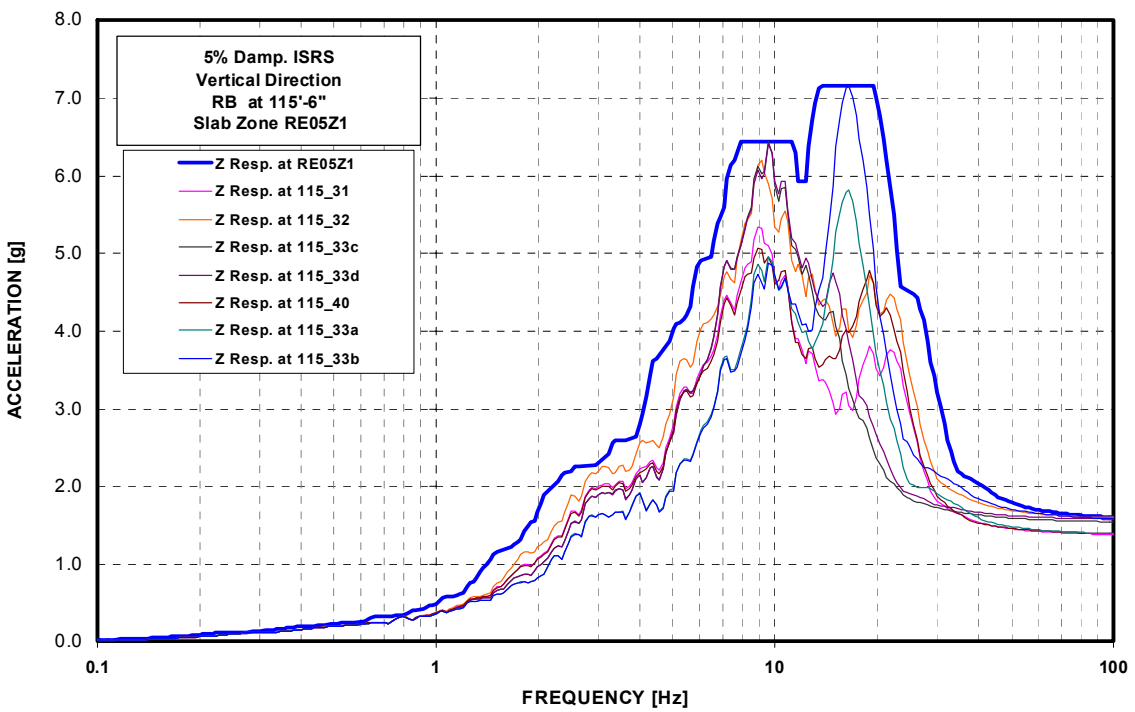


Figure 68 – RE05Z1 ISRS SDOF Vertical Direction

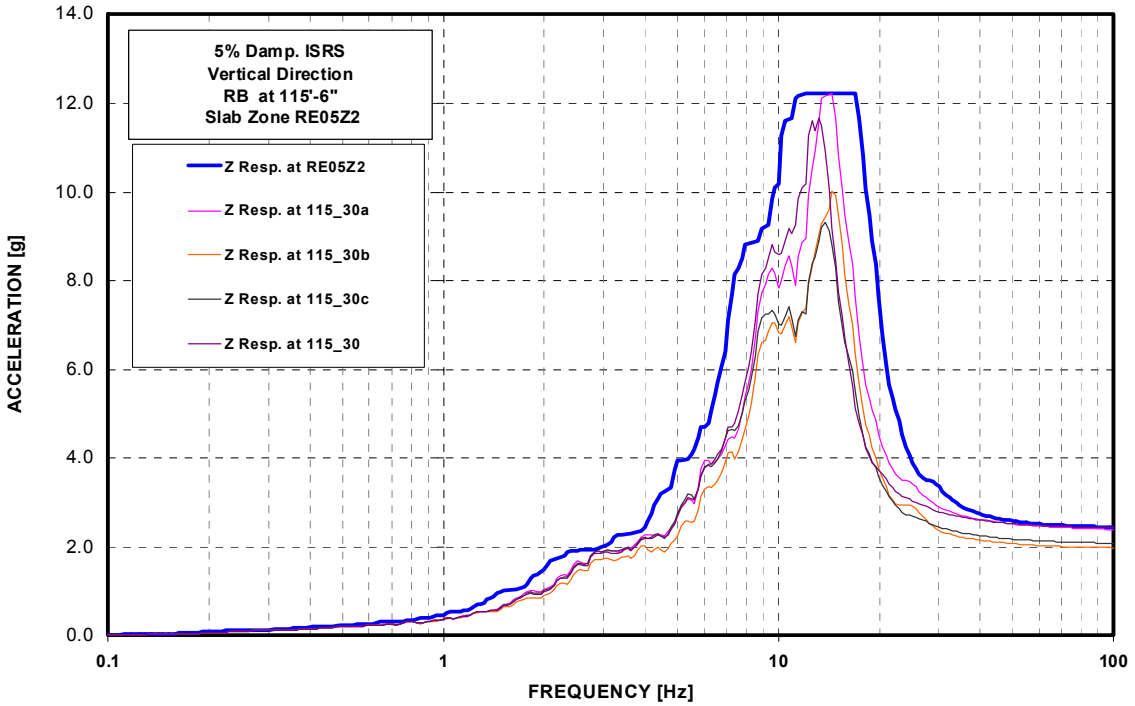


Figure 69 – RE05Z2 ISRS SDOF Vertical Direction

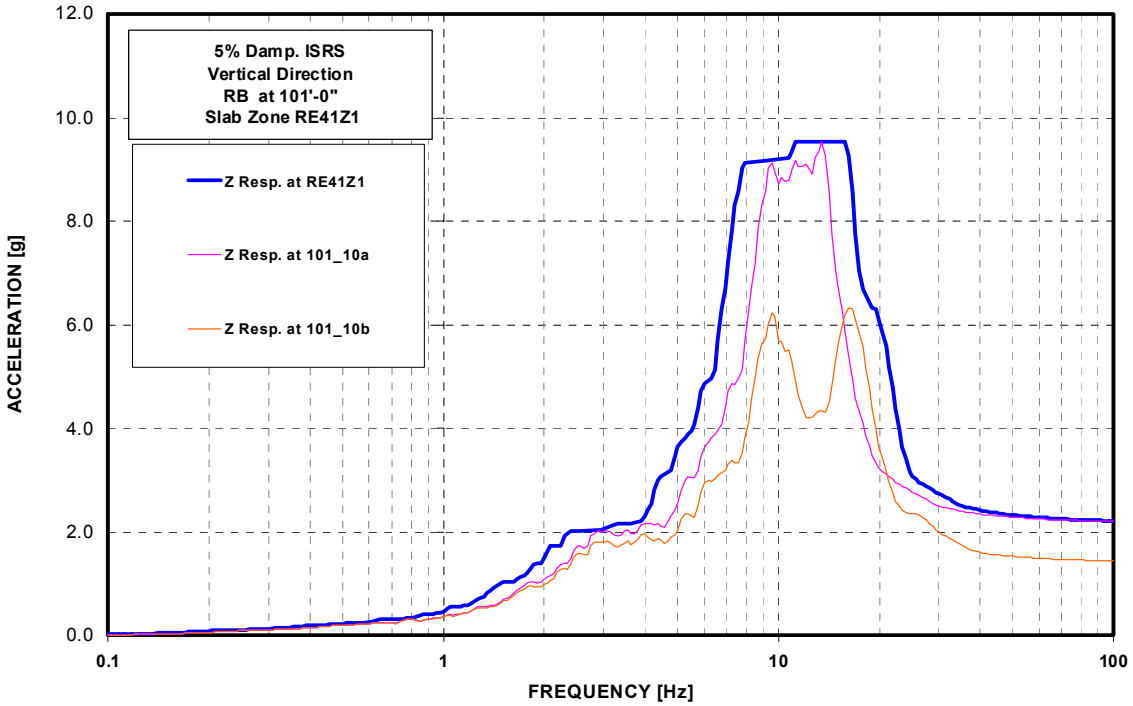


Figure 70 – RE41Z1 ISRS SDOF Vertical Direction

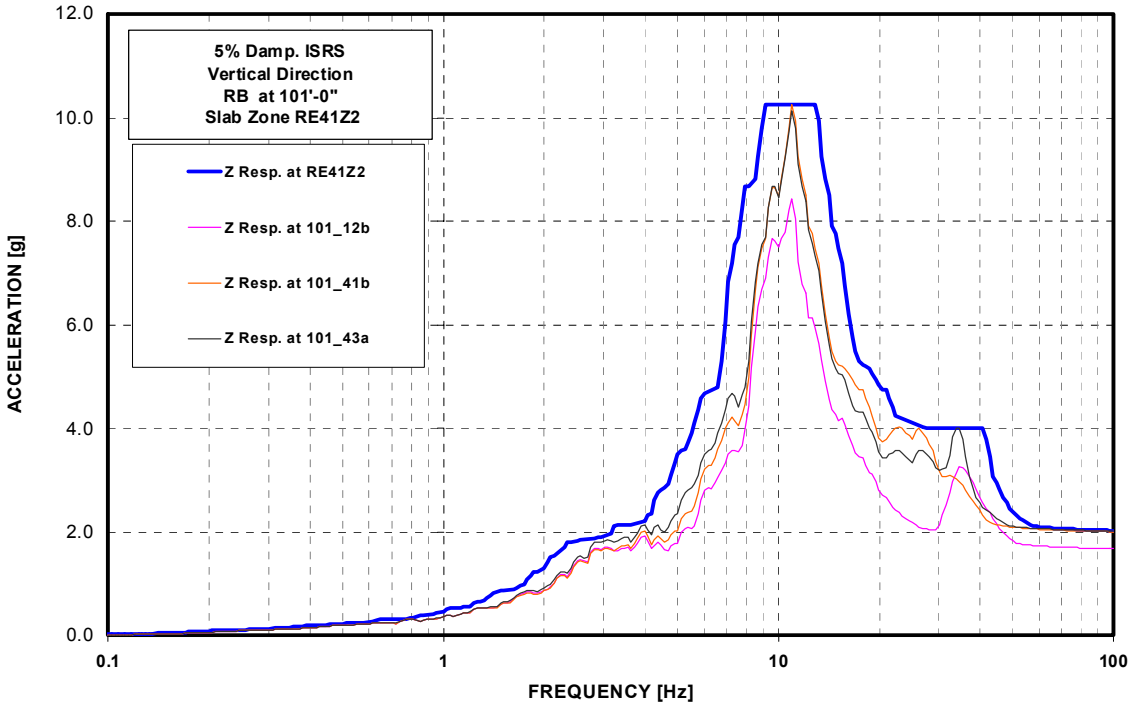


Figure 71 – RE41Z2 ISRS SDOF Vertical Direction

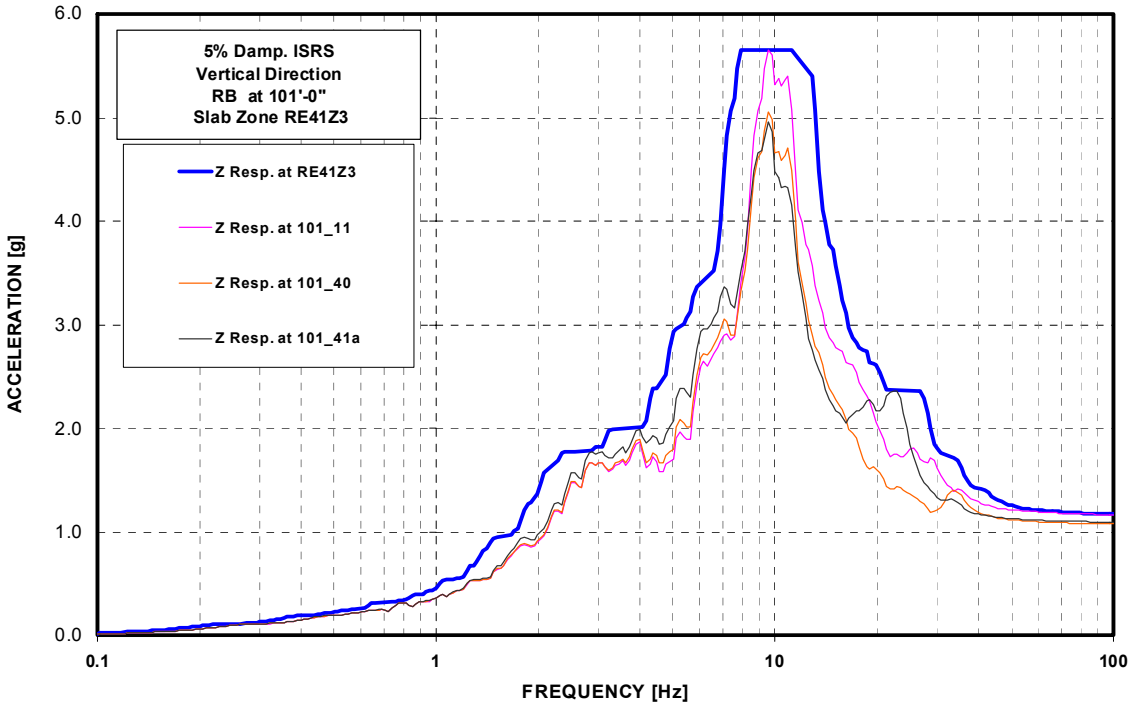


Figure 72 – RE41Z3 ISRS SDOF Vertical Direction

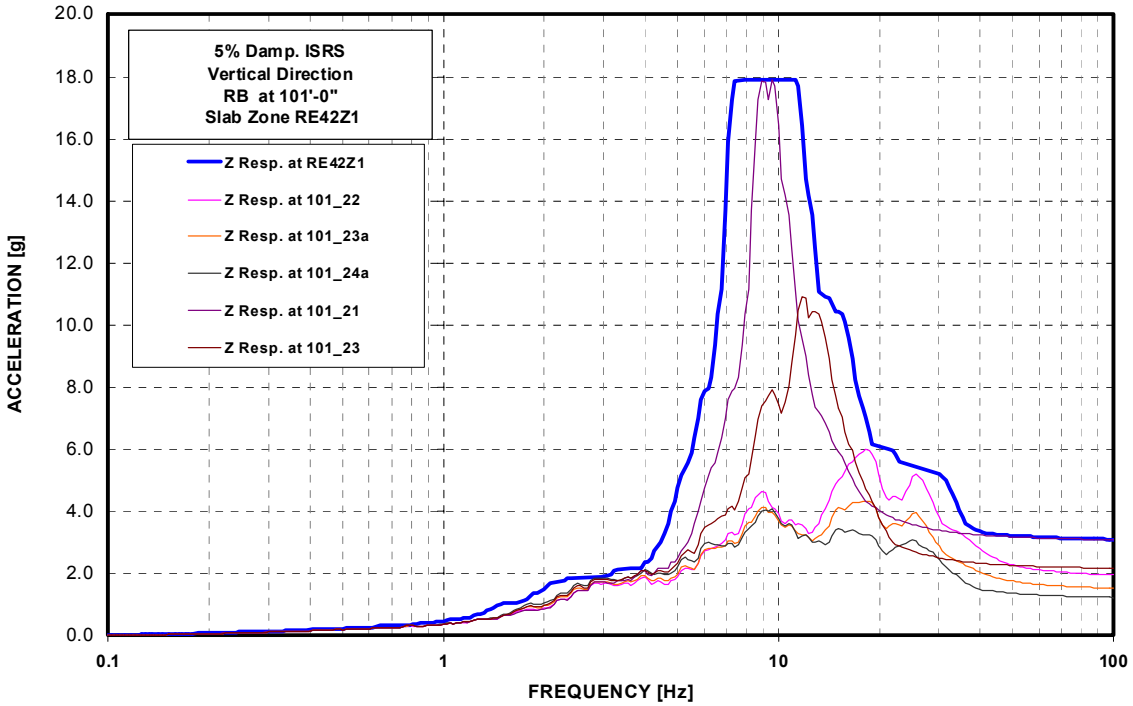
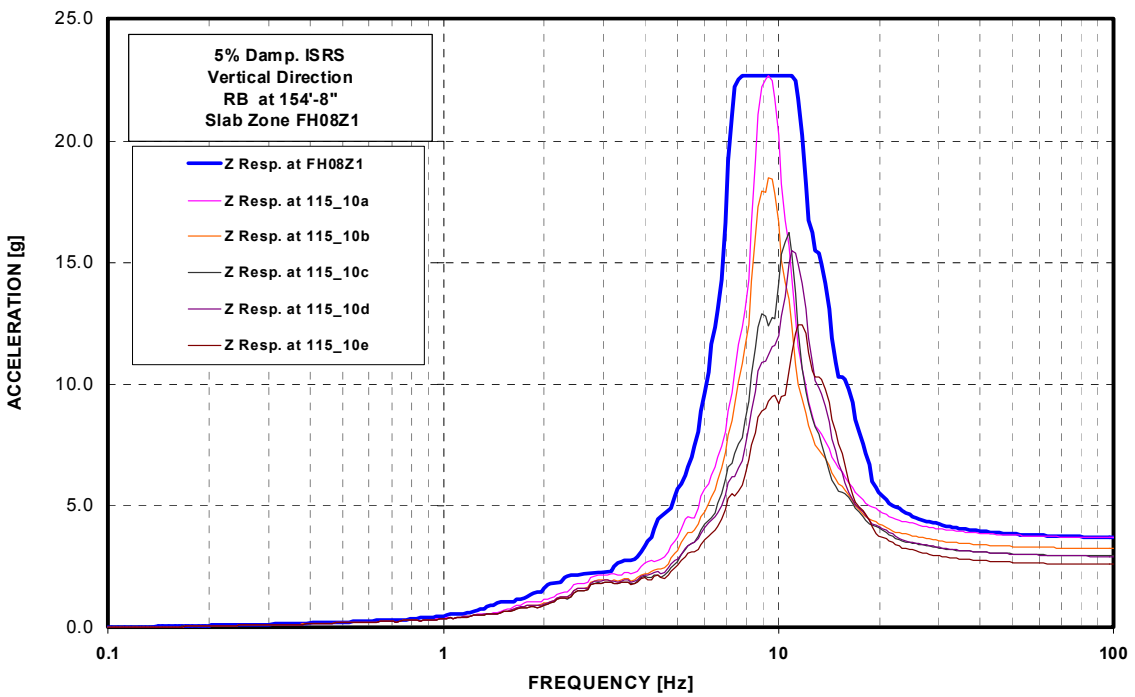


Figure 73 – RE42Z1 ISRS SDOF Vertical Direction



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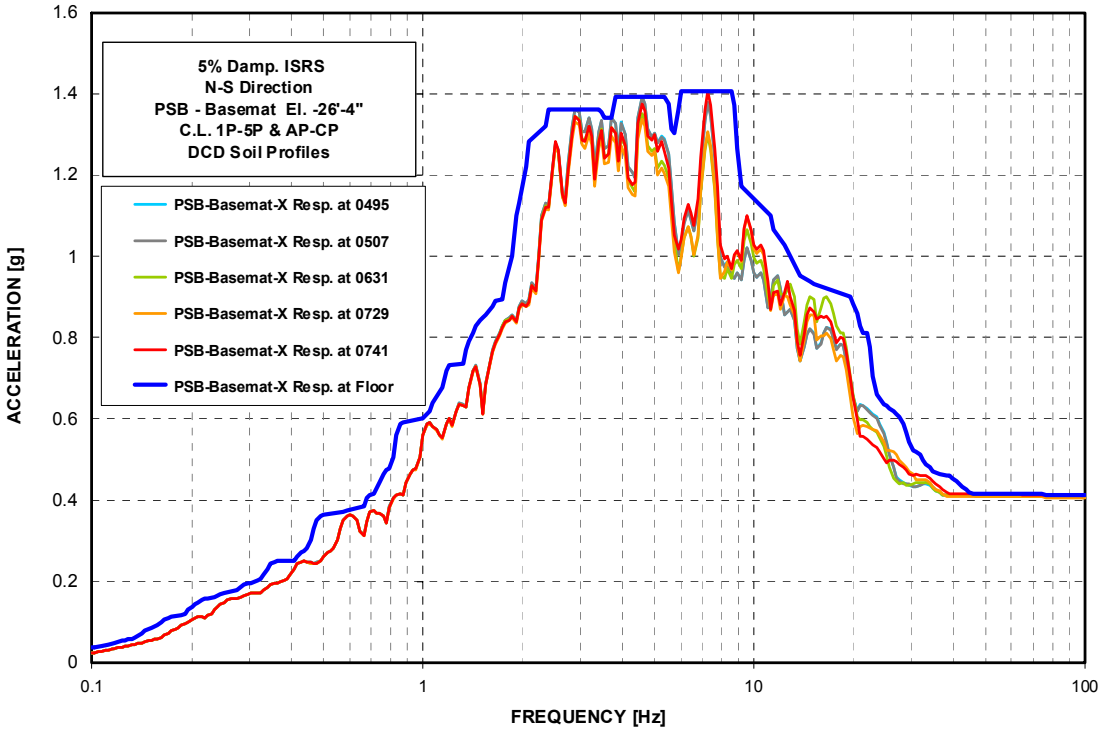


Figure 1 – Basemat ISRS N-S Direction

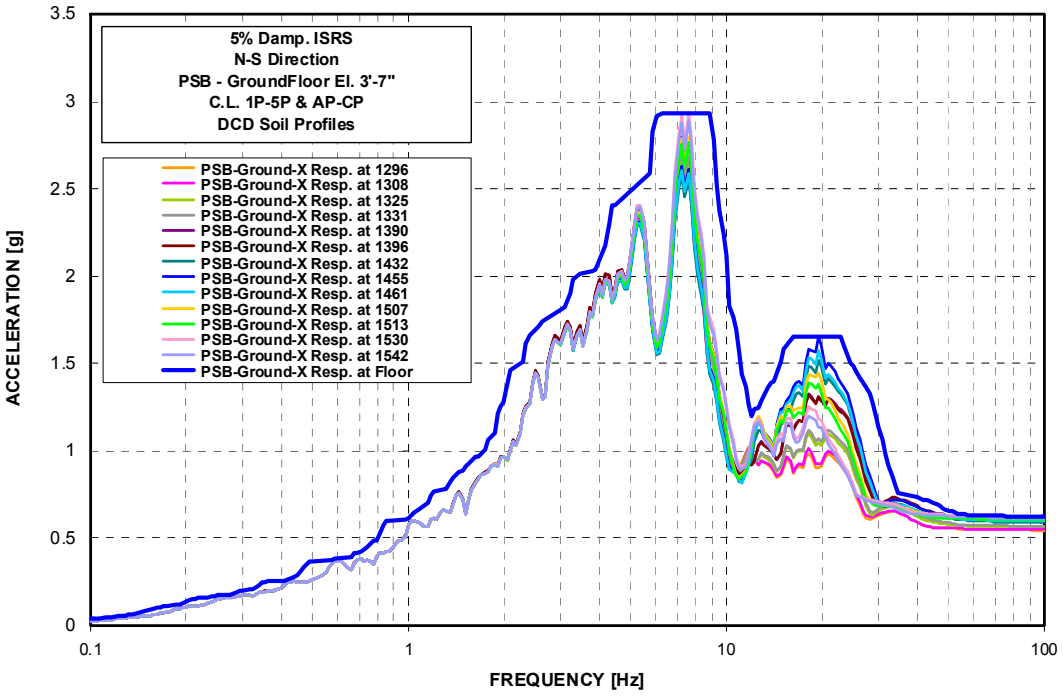


Figure 2 – Ground ISRS N-S Direction

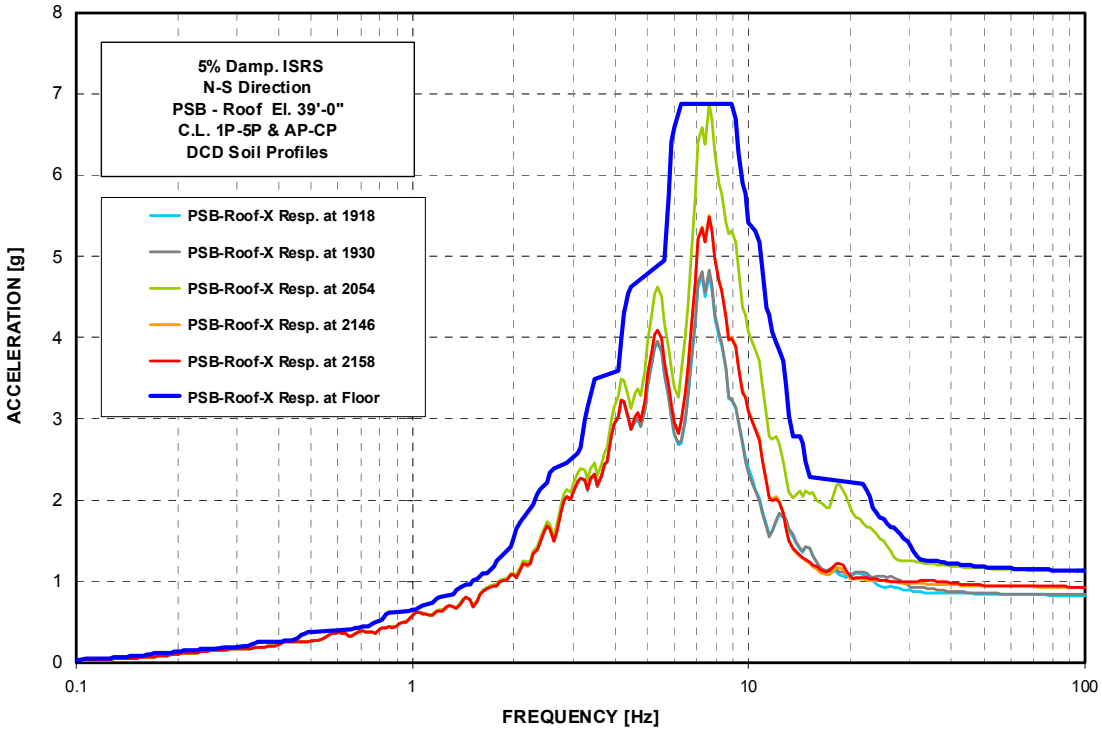


Figure 3 – Roof ISRS N-S Direction

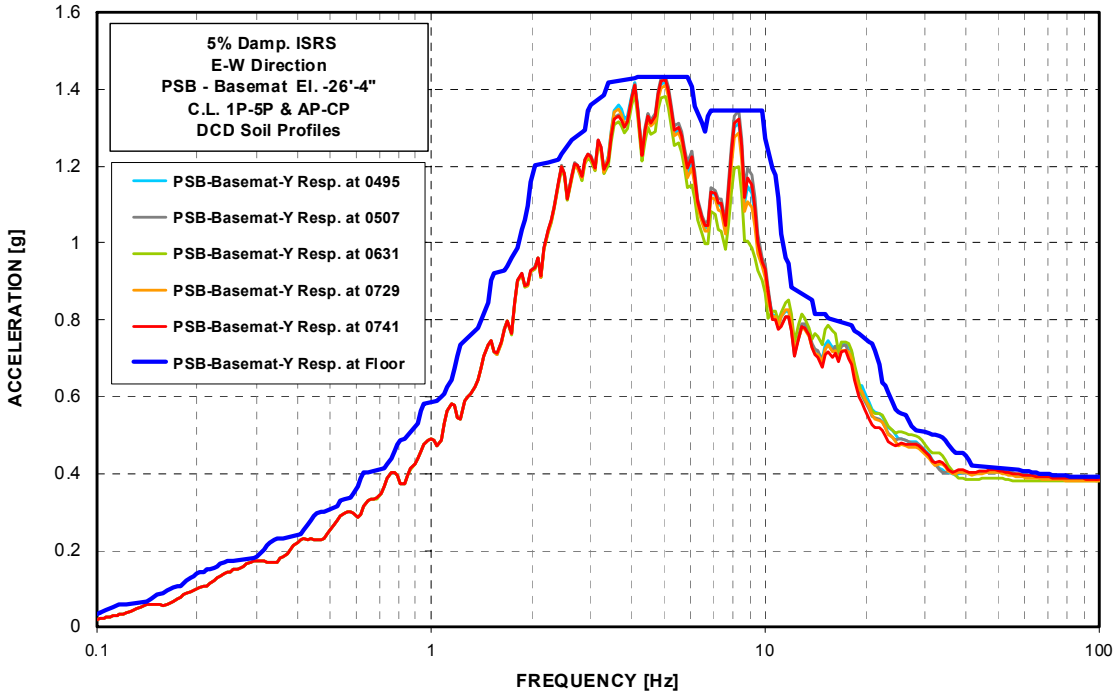


Figure 4 – Basemat ISRS E-W Direction

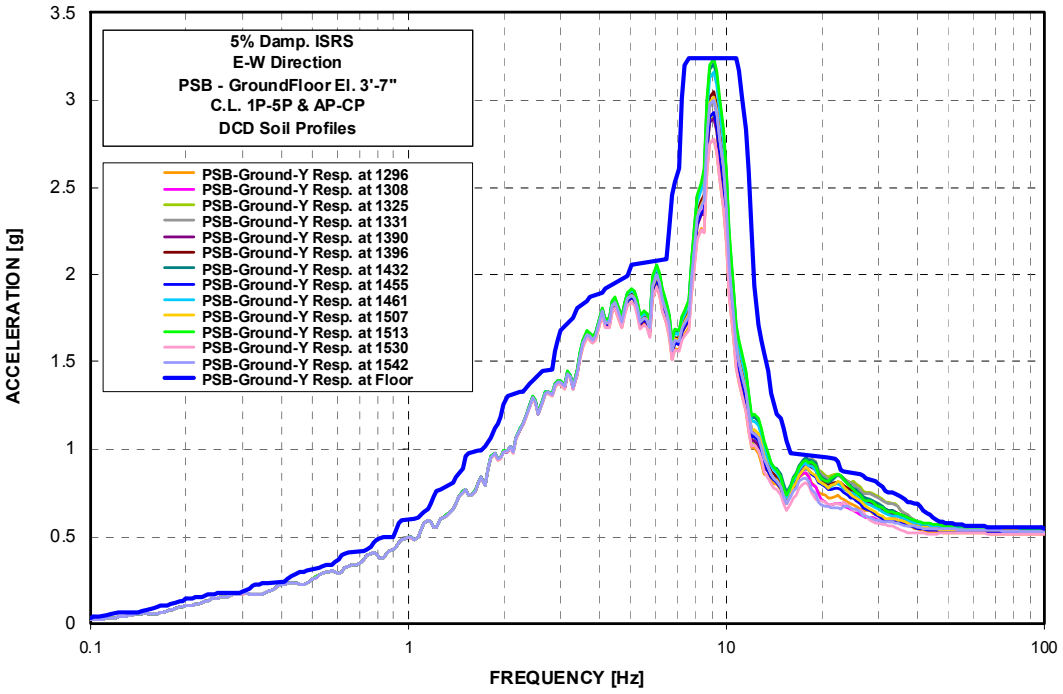


Figure 5 – Ground ISRS E-W Direction

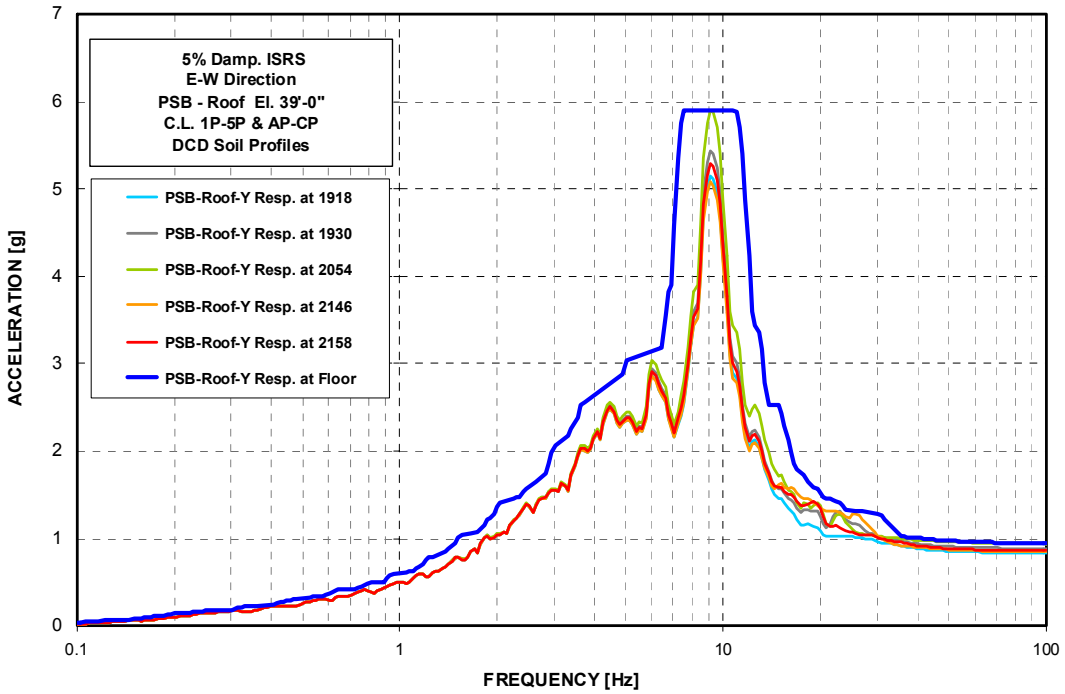


Figure 6 – Roof ISRS E-W Direction

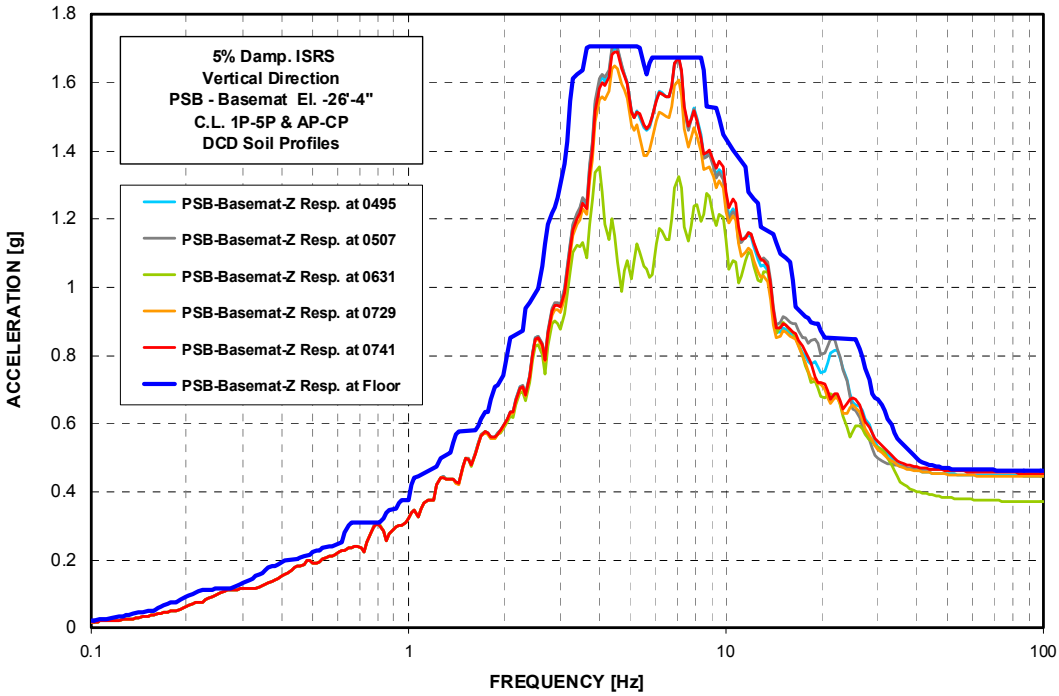
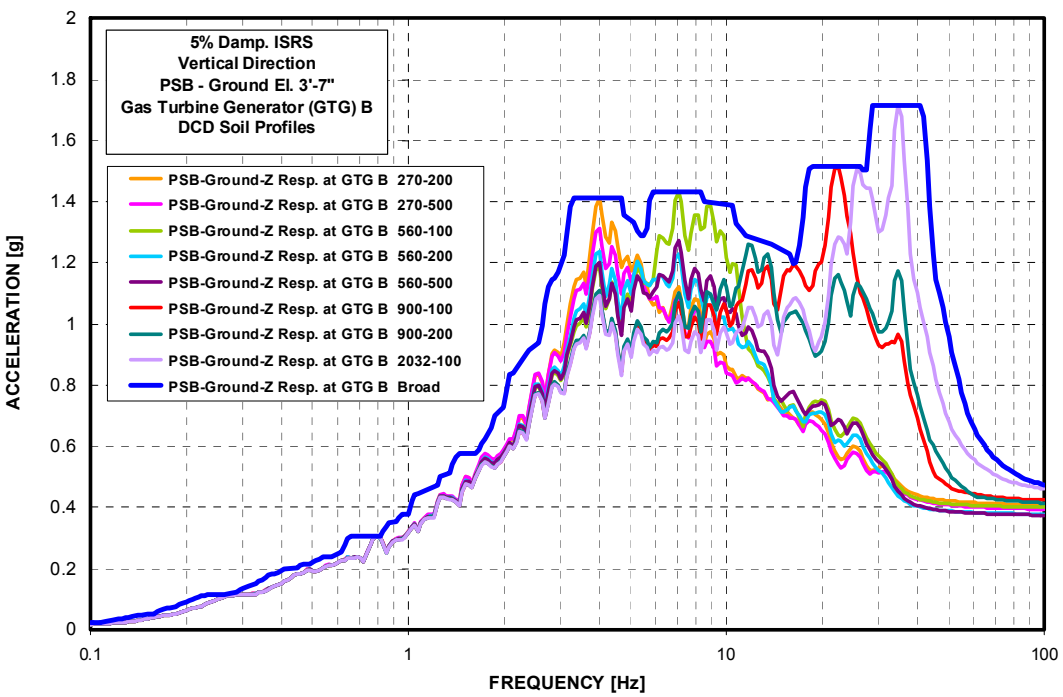


Figure 7 – Basemat ISRS Vertical Direction



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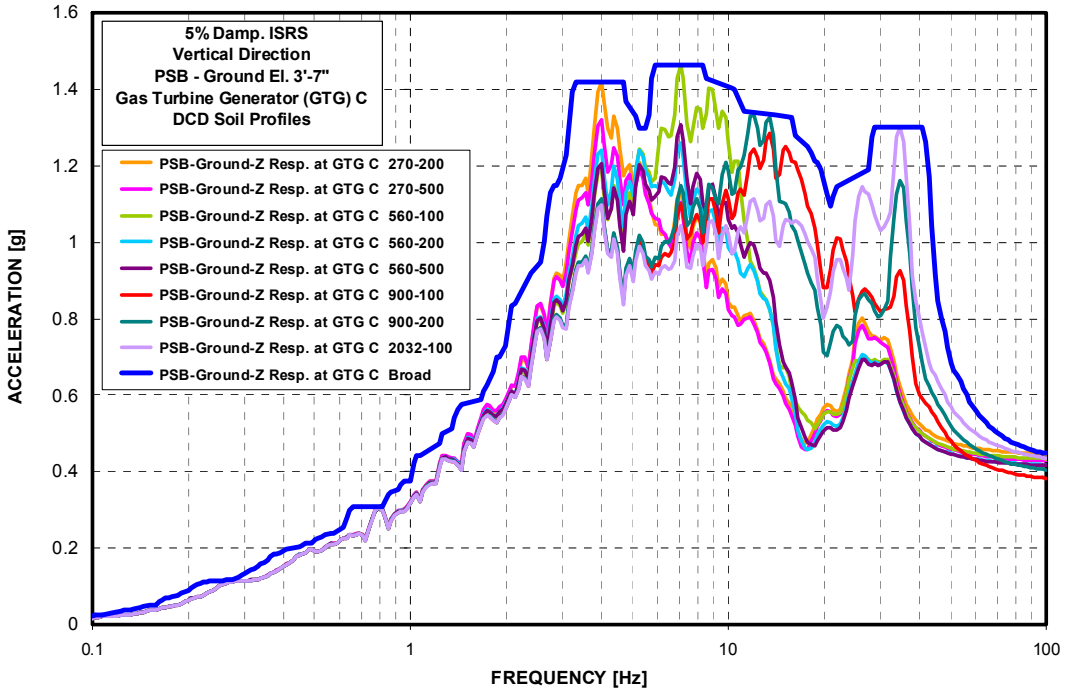
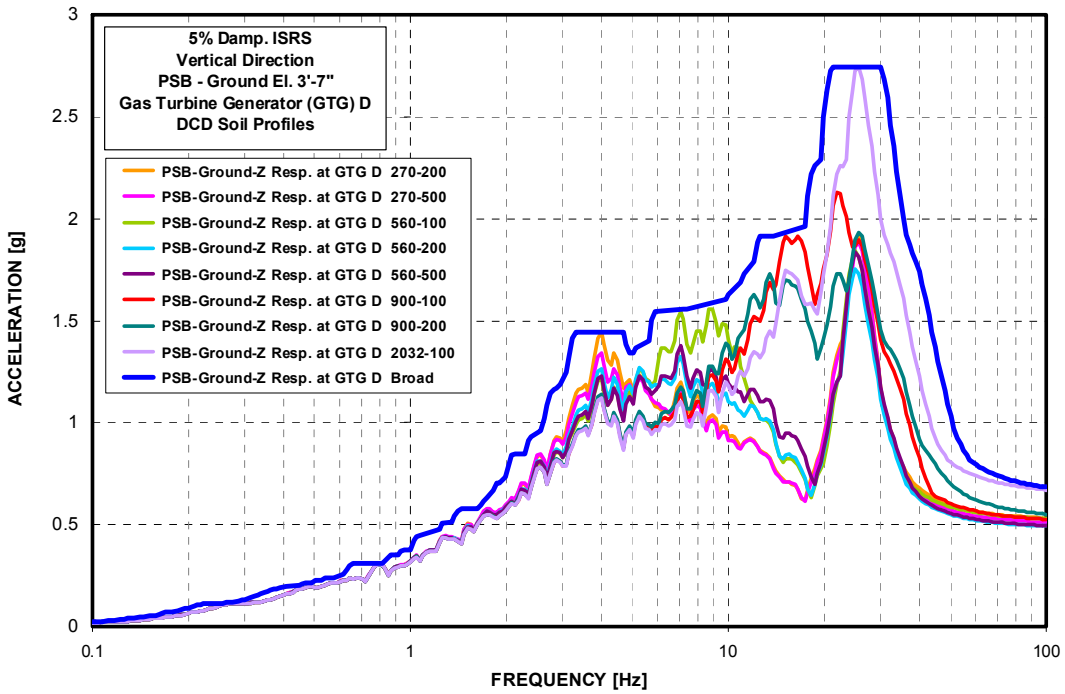


Figure 9 – Gas Turbine Generator C ISRS Vertical Direction



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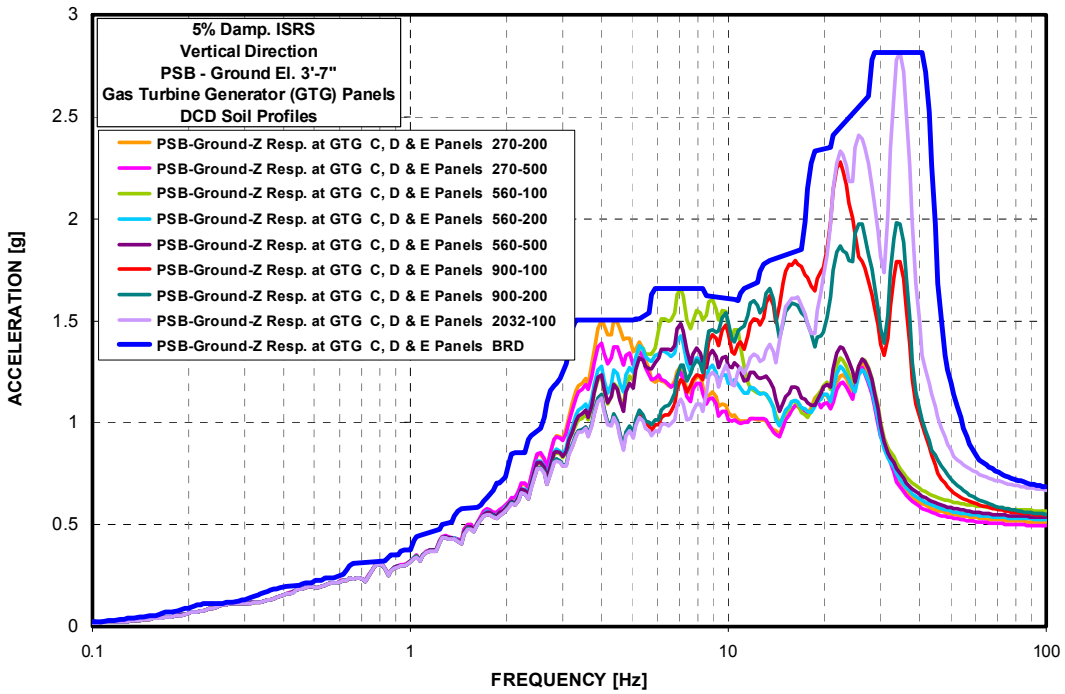

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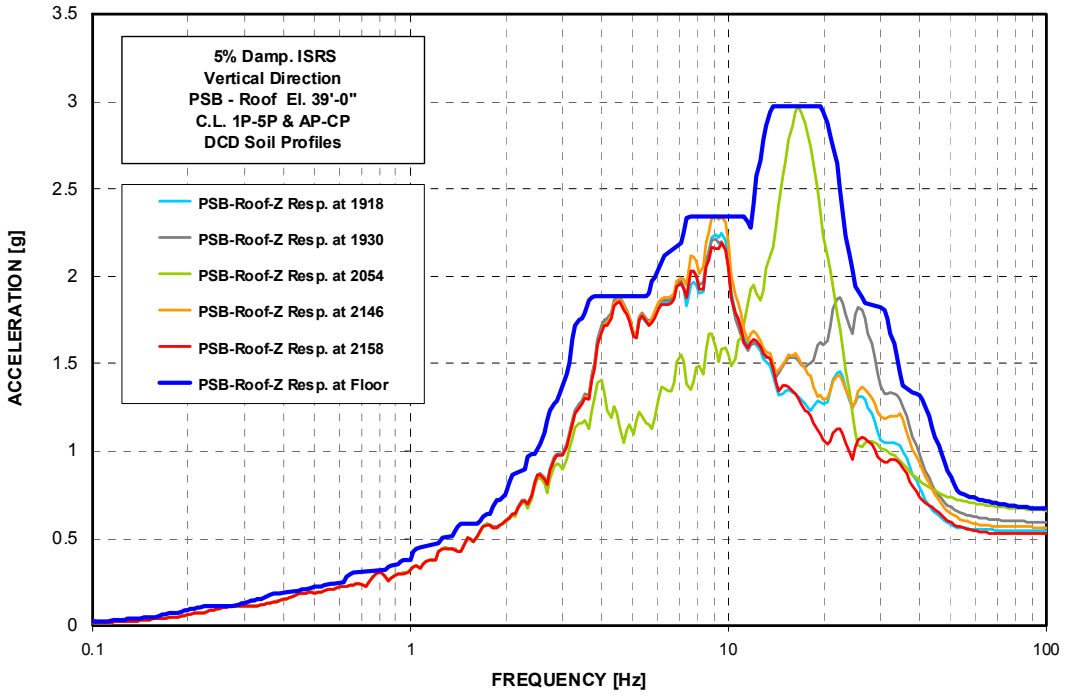

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Appendix G

Maximum Displacements, Maximum Accelerations, and Enveloped Forces for R/B Complex and PS/B

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*Please note that these are the SASSI results. Additional margin is added to the design values provided in the main body of this report.

Table 1 – Maximum Displacements for X-Dir. (R/B and FH/A)

	SRSS Maximum Displacements X-Resp (in)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Max
FH08	1.351	1.241	0.925	1.024	0.897	0.673	0.630	0.684	1.351
NE08	1.351	1.241	0.926	1.024	0.898	0.678	0.634	0.688	1.351
NW08	1.352	1.242	0.923	1.023	0.896	0.668	0.626	0.680	1.352
FH07	1.216	1.103	0.816	0.903	0.784	0.458	0.481	0.473	1.216
RE05	1.092	0.992	0.700	0.787	0.674	0.234	0.262	0.203	1.092
FH06	1.091	0.977	0.713	0.791	0.680	0.288	0.338	0.277	1.091
RE41	1.044	0.940	0.662	0.744	0.635	0.211	0.235	0.172	1.044
RE42	1.043	0.938	0.664	0.743	0.635	0.212	0.240	0.172	1.043
RE04	1.048	0.942	0.667	0.748	0.644	0.216	0.240	0.181	1.048
RE03	0.968	0.853	0.609	0.681	0.576	0.186	0.203	0.142	0.968
NE03	0.968	0.853	0.610	0.682	0.577	0.188	0.208	0.144	0.968
NW03	0.970	0.854	0.607	0.681	0.575	0.184	0.200	0.140	0.970
SE03	0.968	0.853	0.610	0.682	0.577	0.188	0.208	0.144	0.968
SW03	0.970	0.854	0.607	0.681	0.575	0.184	0.200	0.140	0.970
RE02	0.886	0.760	0.544	0.607	0.509	0.165	0.171	0.106	0.886
RE01	0.805	0.670	0.480	0.536	0.442	0.158	0.164	0.069	0.805
RE00	0.736	0.592	0.421	0.475	0.383	0.151	0.157	0.036	0.736

Table 2 – Maximum Displacements for X-Dir. (PCCV)

	SRSS Maximum Displacements X-Resp (in)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Max
CV11	1.667	1.549	1.279	1.372	1.220	0.921	1.032	0.818	1.667
CV10	1.649	1.530	1.263	1.355	1.204	0.907	1.016	0.805	1.649
CV09	1.561	1.439	1.186	1.275	1.129	0.836	0.938	0.742	1.561
CV08	1.447	1.321	1.083	1.152	1.029	0.735	0.828	0.651	1.447
CV07	1.333	1.205	0.980	1.046	0.927	0.632	0.714	0.558	1.333
CV06	1.204	1.073	0.860	0.924	0.809	0.511	0.579	0.446	1.204
CV05	1.103	0.970	0.766	0.827	0.715	0.416	0.470	0.357	1.103
CV04	1.034	0.900	0.702	0.761	0.652	0.353	0.395	0.296	1.034
CV03	0.998	0.864	0.669	0.728	0.620	0.322	0.357	0.264	0.998
CV02	0.922	0.785	0.598	0.655	0.552	0.254	0.277	0.196	0.922
CV01	0.821	0.680	0.502	0.556	0.457	0.170	0.187	0.108	0.821
CV00	0.732	0.587	0.419	0.473	0.381	0.151	0.157	0.036	0.732

Table 3 – Maximum Displacements for X-Dir. (CIS)

	SRSS Maximum Displacements X-Resp (in)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Max
IC09	1.415	1.266	1.148	1.120	1.022	1.200	1.145	1.194	1.415
IC18	1.208	1.070	0.833	0.916	0.816	0.641	0.684	0.614	1.208
IC08	1.220	1.082	0.852	0.928	0.828	0.668	0.712	0.648	1.220
IC05	0.964	0.842	0.614	0.684	0.585	0.205	0.220	0.169	0.964
IC72	1.090	0.974	0.721	0.804	0.701	0.319	0.327	0.294	1.090
IC71	1.087	0.973	0.717	0.799	0.695	0.304	0.315	0.279	1.087
IC62	1.034	0.917	0.674	0.751	0.649	0.266	0.279	0.235	1.034
IC61	1.033	0.917	0.672	0.749	0.647	0.256	0.272	0.229	1.033
IC15	0.905	0.780	0.564	0.628	0.532	0.185	0.191	0.125	0.905
IC04	0.876	0.748	0.538	0.600	0.505	0.178	0.184	0.103	0.876
IC14	0.859	0.731	0.524	0.585	0.490	0.173	0.180	0.091	0.859
IC03	0.826	0.695	0.493	0.553	0.459	0.165	0.171	0.071	0.826
IC02	0.791	0.656	0.462	0.521	0.426	0.157	0.163	0.053	0.791
IC01	0.766	0.628	0.443	0.500	0.406	0.154	0.160	0.045	0.766
IC00	0.732	0.587	0.419	0.473	0.381	0.151	0.157	0.036	0.732

Table 4 – Maximum Displacements for Y-Dir. (R/B and FH/A)

	SRSS Maximum Displacements Y-Resp (in)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Max
FH08	1.500	1.492	1.073	1.031	0.995	0.574	0.655	0.435	1.500
NE08	1.502	1.492	1.072	1.031	0.995	0.569	0.651	0.432	1.502
NW08	1.502	1.492	1.072	1.031	0.995	0.569	0.651	0.432	1.502
FH07	1.357	1.354	0.953	0.925	0.880	0.498	0.565	0.360	1.357
RE05	1.254	1.279	0.872	0.850	0.811	0.459	0.510	0.293	1.279
FH06	1.225	1.228	0.836	0.830	0.772	0.417	0.472	0.277	1.228
RE41	1.204	1.219	0.820	0.810	0.763	0.416	0.463	0.265	1.219
RE42	1.196	1.214	0.815	0.809	0.756	0.409	0.455	0.250	1.214
RE04	1.183	1.210	0.813	0.802	0.755	0.422	0.468	0.260	1.210
RE03	1.070	1.090	0.707	0.721	0.653	0.338	0.377	0.191	1.090
NE03	1.086	1.093	0.705	0.727	0.651	0.318	0.359	0.179	1.093
NW03	1.086	1.093	0.705	0.727	0.651	0.318	0.359	0.179	1.093
SE03	1.055	1.086	0.708	0.716	0.654	0.358	0.395	0.203	1.086
SW03	1.055	1.086	0.708	0.716	0.654	0.358	0.395	0.203	1.086
RE02	0.944	0.962	0.601	0.636	0.551	0.270	0.302	0.134	0.962
RE01	0.830	0.839	0.498	0.552	0.454	0.207	0.234	0.082	0.839
RE00	0.742	0.734	0.413	0.482	0.374	0.158	0.188	0.042	0.742

Table 5 – Maximum Displacements for Y-Dir. (PCCV)

	SRSS Maximum Displacements Y-Resp (in)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Max
CV11	2.104	2.015	1.600	1.498	1.440	1.258	1.351	0.974	2.104
CV10	2.076	1.984	1.578	1.474	1.419	1.239	1.331	0.958	2.076
CV09	1.945	1.838	1.470	1.367	1.318	1.143	1.229	0.875	1.945
CV08	1.776	1.652	1.326	1.238	1.188	1.010	1.088	0.759	1.776
CV07	1.608	1.468	1.183	1.100	1.059	0.873	0.943	0.639	1.608
CV06	1.416	1.307	1.017	0.965	0.911	0.713	0.774	0.498	1.416
CV05	1.267	1.187	0.887	0.860	0.794	0.587	0.640	0.388	1.267
CV04	1.165	1.106	0.799	0.789	0.716	0.502	0.549	0.314	1.165
CV03	1.114	1.064	0.753	0.753	0.676	0.459	0.503	0.277	1.114
CV02	1.000	0.971	0.654	0.674	0.589	0.367	0.406	0.199	1.000
CV01	0.847	0.844	0.523	0.570	0.471	0.250	0.281	0.107	0.847
CV00	0.738	0.728	0.410	0.479	0.370	0.157	0.187	0.041	0.738

Table 6 – Maximum Displacements for Y-Dir. (CIS)

	SRSS Maximum Displacements Y-Resp (in)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Max
IC09	1.536	1.565	1.319	1.231	1.229	1.112	1.052	1.015	1.565
IC18	1.333	1.362	1.063	1.003	0.989	0.732	0.748	0.666	1.362
IC08	1.345	1.374	1.078	1.017	1.003	0.755	0.765	0.687	1.374
IC05	1.091	1.118	0.753	0.742	0.698	0.394	0.423	0.263	1.118
IC72	1.304	1.336	0.970	0.925	0.906	0.586	0.608	0.433	1.336
IC71	1.297	1.333	0.961	0.921	0.900	0.567	0.601	0.426	1.333
IC62	1.212	1.243	0.875	0.839	0.817	0.501	0.527	0.358	1.243
IC61	1.208	1.242	0.871	0.837	0.815	0.493	0.525	0.354	1.242
IC15	0.992	1.019	0.657	0.671	0.607	0.319	0.346	0.190	1.019
IC04	0.943	0.966	0.608	0.635	0.561	0.281	0.307	0.154	0.966
IC14	0.917	0.938	0.583	0.617	0.538	0.261	0.287	0.135	0.938
IC03	0.863	0.881	0.530	0.577	0.487	0.220	0.246	0.096	0.881
IC02	0.815	0.824	0.481	0.540	0.441	0.188	0.214	0.067	0.824
IC01	0.782	0.769	0.450	0.514	0.410	0.173	0.199	0.054	0.782
IC00	0.738	0.728	0.410	0.479	0.370	0.157	0.187	0.041	0.738

Table 7 – Maximum Displacements for Z-Dir. (R/B and FH/A)

	SRSS Maximum Displacements Z-Resp (in)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Max
FH08	0.403	0.448	0.241	0.300	0.277	0.161	0.165	0.124	0.448
NE08	0.696	0.767	0.478	0.530	0.500	0.325	0.331	0.277	0.767
NW08	0.590	0.653	0.394	0.449	0.422	0.285	0.275	0.248	0.653
FH07	0.412	0.457	0.248	0.308	0.284	0.164	0.167	0.128	0.457
RE05	0.373	0.406	0.231	0.287	0.262	0.164	0.165	0.126	0.406
FH06	0.410	0.456	0.244	0.306	0.282	0.158	0.160	0.122	0.456
RE41	0.413	0.449	0.269	0.303	0.281	0.159	0.177	0.109	0.449
RE42	0.419	0.448	0.282	0.309	0.292	0.172	0.197	0.115	0.448
RE04	0.382	0.416	0.236	0.294	0.269	0.166	0.167	0.128	0.416
RE03	0.220	0.216	0.119	0.157	0.138	0.097	0.103	0.038	0.220
NE03	0.661	0.738	0.437	0.494	0.467	0.245	0.273	0.194	0.738
NW03	0.655	0.734	0.431	0.488	0.462	0.243	0.267	0.189	0.734
SE03	0.673	0.748	0.454	0.512	0.483	0.272	0.294	0.217	0.748
SW03	0.670	0.744	0.448	0.508	0.478	0.262	0.285	0.211	0.744
RE02	0.217	0.216	0.115	0.154	0.135	0.092	0.098	0.028	0.217
RE01	0.215	0.215	0.114	0.151	0.132	0.089	0.096	0.023	0.215
RE00	0.209	0.209	0.110	0.146	0.127	0.086	0.093	0.017	0.209

Table 8 – Maximum Displacements for Z-Dir. (PCCV)

	SRSS Maximum Displacements Z-Resp (in)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Max
CV11	0.244	0.227	0.154	0.199	0.161	0.141	0.127	0.121	0.244
CV10	0.240	0.224	0.149	0.194	0.158	0.130	0.119	0.109	0.240
CV09	0.234	0.221	0.139	0.183	0.152	0.108	0.114	0.085	0.234
CV08	0.230	0.220	0.134	0.177	0.148	0.102	0.111	0.072	0.230
CV07	0.228	0.218	0.132	0.174	0.147	0.101	0.109	0.067	0.228
CV06	0.226	0.217	0.128	0.170	0.144	0.099	0.107	0.059	0.226
CV05	0.223	0.217	0.125	0.166	0.141	0.097	0.105	0.052	0.223
CV04	0.221	0.216	0.122	0.163	0.139	0.095	0.103	0.046	0.221
CV03	0.220	0.215	0.121	0.162	0.138	0.095	0.102	0.043	0.220
CV02	0.217	0.214	0.117	0.158	0.135	0.093	0.100	0.035	0.217
CV01	0.214	0.212	0.113	0.152	0.131	0.090	0.096	0.025	0.214
CV00	0.209	0.210	0.110	0.147	0.127	0.086	0.093	0.017	0.210

Table 9 – Maximum Displacements for Z-Dir. (CIS)

	SRSS Maximum Displacements Z-Resp (in)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Max
IC09	0.245	0.245	0.155	0.188	0.171	0.129	0.133	0.084	0.245
IC18	0.245	0.245	0.154	0.187	0.170	0.127	0.132	0.083	0.245
IC08	0.245	0.245	0.154	0.188	0.170	0.128	0.133	0.083	0.245
IC05	0.215	0.214	0.114	0.152	0.135	0.093	0.099	0.028	0.215
IC72	0.312	0.319	0.223	0.238	0.230	0.174	0.172	0.132	0.319
IC71	0.310	0.318	0.221	0.236	0.228	0.170	0.168	0.128	0.318
IC62	0.286	0.292	0.193	0.213	0.203	0.146	0.147	0.103	0.292
IC61	0.284	0.292	0.192	0.212	0.202	0.145	0.145	0.101	0.292
IC15	0.214	0.212	0.114	0.151	0.133	0.091	0.098	0.026	0.214
IC04	0.212	0.212	0.113	0.150	0.132	0.090	0.097	0.024	0.212
IC14	0.212	0.212	0.113	0.150	0.131	0.090	0.097	0.023	0.212
IC03	0.212	0.212	0.112	0.149	0.130	0.089	0.095	0.021	0.212
IC02	0.212	0.211	0.112	0.148	0.129	0.088	0.094	0.019	0.212
IC01	0.210	0.210	0.111	0.147	0.128	0.087	0.094	0.018	0.210
IC00	0.209	0.209	0.110	0.146	0.127	0.086	0.093	0.017	0.209

Table 10 – Maximum Accelerations of Major Elevations for X-Dir. (R/B and FH/A)

	SRSS Acceleration X-Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
FH08	0.691	0.572	0.935	0.685	0.678	2.382	2.058	2.353	2.382
FH07	0.596	0.477	0.793	0.648	0.615	1.550	1.337	1.512	1.550
RE05	0.527	0.433	0.627	0.595	0.548	0.684	0.636	0.744	0.744
FH06	0.533	0.430	0.669	0.603	0.571	0.764	0.749	0.776	0.776
RE41	0.499	0.425	0.594	0.572	0.530	0.620	0.600	0.652	0.652
RE42	0.489	0.411	0.586	0.565	0.527	0.611	0.582	0.620	0.620
RE04	0.495	0.411	0.586	0.558	0.516	0.631	0.588	0.647	0.647
RE03	0.449	0.395	0.539	0.514	0.482	0.575	0.528	0.536	0.575
RE02	0.420	0.377	0.515	0.466	0.457	0.534	0.474	0.493	0.534
RE01	0.413	0.362	0.493	0.442	0.437	0.458	0.426	0.419	0.493
RE00	0.408	0.352	0.473	0.419	0.416	0.378	0.400	0.345	0.473

Table 11 – Maximum Accelerations of Major Elevations for X-Dir. (PCCV)

	SRSS Acceleration X-Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
CV11	0.870	0.702	1.253	1.004	0.940	1.685	1.787	1.457	1.787
CV10	0.856	0.685	1.230	0.991	0.926	1.650	1.760	1.428	1.760
CV09	0.804	0.641	1.132	0.928	0.874	1.507	1.630	1.286	1.630
CV08	0.734	0.584	0.997	0.843	0.811	1.370	1.459	1.137	1.459
CV07	0.666	0.528	0.870	0.769	0.748	1.228	1.285	1.033	1.285
CV06	0.588	0.467	0.765	0.681	0.664	1.054	1.106	0.906	1.106
CV05	0.544	0.442	0.708	0.644	0.613	0.908	0.971	0.793	0.971
CV04	0.512	0.424	0.673	0.614	0.586	0.804	0.869	0.712	0.869
CV03	0.493	0.414	0.653	0.595	0.570	0.749	0.813	0.673	0.813
CV02	0.450	0.396	0.603	0.547	0.529	0.627	0.687	0.579	0.687
CV01	0.421	0.374	0.533	0.476	0.465	0.471	0.510	0.438	0.533
CV00	0.408	0.352	0.472	0.418	0.415	0.378	0.400	0.345	0.472

Table 12 – Maximum Accelerations of Major Elevations for X-Dir. (CIS)

	SRSS Acceleration X-Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
IC09	1.066	0.902	1.512	1.102	1.263	3.921	3.356	3.786	3.921
IC18	0.680	0.558	1.047	0.738	0.823	1.837	1.599	1.777	1.837
IC08	0.700	0.573	1.076	0.758	0.848	1.959	1.702	1.894	1.959
IC05	0.483	0.421	0.588	0.565	0.539	0.694	0.661	0.688	0.694
IC72	0.694	0.604	0.897	0.737	0.750	1.349	1.101	1.458	1.458
IC71	0.696	0.611	0.875	0.732	0.735	1.260	1.104	1.361	1.361
IC62	0.567	0.487	0.717	0.626	0.613	1.015	0.888	1.016	1.016
IC61	0.563	0.484	0.719	0.622	0.609	0.990	0.884	0.979	0.990
IC15	0.445	0.403	0.553	0.532	0.507	0.533	0.544	0.538	0.553
IC04	0.442	0.400	0.546	0.515	0.499	0.472	0.510	0.493	0.546
IC14	0.436	0.393	0.538	0.500	0.488	0.447	0.480	0.463	0.538
IC03	0.426	0.379	0.520	0.472	0.470	0.409	0.415	0.405	0.520
IC02	0.414	0.364	0.501	0.451	0.445	0.393	0.395	0.362	0.501
IC01	0.411	0.357	0.489	0.436	0.432	0.386	0.398	0.353	0.489
IC00	0.408	0.352	0.472	0.418	0.415	0.378	0.400	0.345	0.472

Table 13 – Maximum Accelerations of Major Elevations for Y-Dir. (R/B and FH/A)

	SRSS Acceleration Y-Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
FH08	0.696	0.552	0.891	0.737	0.710	1.359	1.392	1.160	1.392
FH07	0.594	0.486	0.800	0.603	0.633	1.037	1.065	0.938	1.065
RE05	0.546	0.491	0.709	0.612	0.587	0.860	0.908	0.793	0.908
FH06	0.522	0.471	0.707	0.529	0.565	0.753	0.808	0.720	0.808
RE41	0.591	0.549	0.708	0.649	0.609	0.912	0.891	0.920	0.920
RE42	0.531	0.476	0.693	0.558	0.577	0.770	0.782	0.785	0.785
RE04	0.519	0.478	0.667	0.559	0.546	0.779	0.793	0.683	0.793
RE03	0.494	0.458	0.596	0.485	0.483	0.621	0.626	0.549	0.626
RE02	0.469	0.435	0.519	0.440	0.443	0.489	0.491	0.448	0.519
RE01	0.458	0.412	0.464	0.390	0.394	0.447	0.413	0.410	0.464
RE00	0.447	0.392	0.412	0.347	0.342	0.421	0.398	0.348	0.447

Table 14 – Maximum Accelerations of Major Elevations for Y-Dir. (PCCV)

	SRSS Acceleration Y-Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
CV11	1.090	1.034	1.394	1.218	1.090	2.154	2.349	1.874	2.349
CV10	1.071	1.014	1.373	1.196	1.071	2.117	2.306	1.844	2.306
CV09	0.989	0.919	1.272	1.091	0.984	1.929	2.096	1.692	2.096
CV08	0.889	0.808	1.136	0.968	0.899	1.667	1.813	1.484	1.813
CV07	0.790	0.706	1.000	0.872	0.828	1.423	1.552	1.261	1.552
CV06	0.666	0.584	0.844	0.769	0.748	1.205	1.274	0.982	1.274
CV05	0.578	0.485	0.754	0.690	0.679	1.018	1.061	0.754	1.061
CV04	0.550	0.438	0.698	0.633	0.625	0.886	0.918	0.687	0.918
CV03	0.535	0.427	0.667	0.602	0.595	0.815	0.842	0.652	0.842
CV02	0.498	0.403	0.597	0.530	0.524	0.658	0.676	0.569	0.676
CV01	0.450	0.398	0.499	0.425	0.423	0.464	0.467	0.457	0.499
CV00	0.447	0.391	0.410	0.346	0.340	0.421	0.398	0.348	0.447

Table 15 – Maximum Accelerations of Major Elevations for Y-Dir. (CIS)

	SRSS Acceleration Y-Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
IC09	0.834	0.751	1.310	1.083	1.172	2.917	2.582	2.815	2.917
IC18	0.665	0.595	0.966	0.762	0.819	1.838	1.695	1.766	1.838
IC08	0.675	0.602	0.986	0.777	0.834	1.897	1.746	1.827	1.897
IC05	0.517	0.475	0.645	0.510	0.550	0.810	0.784	0.731	0.810
IC72	0.601	0.565	0.871	0.723	0.767	1.471	1.373	1.438	1.471
IC71	0.663	0.575	0.867	0.728	0.761	1.304	1.219	1.246	1.304
IC62	0.543	0.507	0.766	0.621	0.665	1.108	0.982	0.939	1.108
IC61	0.541	0.510	0.747	0.612	0.648	1.020	0.951	0.890	1.020
IC15	0.487	0.452	0.557	0.435	0.469	0.659	0.647	0.626	0.659
IC04	0.474	0.442	0.519	0.422	0.433	0.585	0.580	0.582	0.585
IC14	0.468	0.435	0.502	0.412	0.415	0.544	0.540	0.549	0.549
IC03	0.463	0.423	0.475	0.391	0.395	0.494	0.470	0.470	0.494
IC02	0.459	0.411	0.448	0.371	0.372	0.457	0.435	0.409	0.459
IC01	0.453	0.401	0.432	0.358	0.358	0.438	0.417	0.381	0.453
IC00	0.447	0.391	0.410	0.346	0.340	0.421	0.398	0.348	0.447

Table 16 – Maximum Accelerations of Major Elevations for Z-Dir. (R/B and FH/A)

	SRSS Acceleration Z-Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
FH08	0.531	0.495	0.580	0.519	0.536	0.929	0.833	0.974	0.974
FH07	0.499	0.450	0.555	0.502	0.506	0.896	0.790	0.904	0.904
RE05	0.412	0.383	0.515	0.448	0.448	0.870	0.774	0.856	0.870
FH06	0.456	0.434	0.523	0.480	0.482	0.833	0.728	0.804	0.833
RE41	0.469	0.433	0.518	0.523	0.511	0.953	0.858	0.894	0.953
RE42	0.440	0.420	0.558	0.512	0.505	0.760	0.758	0.664	0.760
RE04	0.413	0.381	0.513	0.447	0.448	0.854	0.765	0.844	0.854
RE03	0.323	0.302	0.410	0.384	0.372	0.530	0.517	0.459	0.530
RE02	0.316	0.292	0.397	0.372	0.360	0.483	0.481	0.409	0.483
RE01	0.309	0.277	0.380	0.354	0.344	0.440	0.446	0.369	0.446
RE00	0.311	0.282	0.367	0.355	0.330	0.394	0.407	0.333	0.407

Table 17 – Maximum Accelerations of Major Elevations for Z-Dir. (PCCV)

	SRSS Acceleration Z-Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
CV11	0.702	0.654	0.672	0.666	0.645	1.458	0.958	1.495	1.495
CV10	0.644	0.595	0.621	0.611	0.589	1.319	0.903	1.367	1.367
CV09	0.526	0.479	0.522	0.515	0.483	1.041	0.791	1.062	1.062
CV08	0.460	0.414	0.480	0.456	0.426	0.893	0.726	0.906	0.906
CV07	0.437	0.391	0.466	0.434	0.405	0.841	0.701	0.849	0.849
CV06	0.398	0.356	0.441	0.401	0.375	0.754	0.658	0.754	0.754
CV05	0.365	0.326	0.418	0.375	0.350	0.675	0.616	0.665	0.675
CV04	0.342	0.304	0.399	0.355	0.331	0.616	0.583	0.600	0.616
CV03	0.330	0.292	0.391	0.355	0.323	0.583	0.565	0.564	0.583
CV02	0.317	0.286	0.372	0.356	0.324	0.508	0.523	0.484	0.523
CV01	0.315	0.285	0.368	0.356	0.328	0.439	0.462	0.391	0.462
CV00	0.312	0.282	0.367	0.355	0.330	0.394	0.407	0.333	0.407

Table 18 – Maximum Accelerations of Major Elevations for Z-Dir. (CIS)

	SRSS Acceleration Z-Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
IC09	0.492	0.460	0.541	0.516	0.521	0.660	0.717	0.778	0.778
IC18	0.443	0.433	0.518	0.491	0.496	0.636	0.686	0.715	0.715
IC08	0.450	0.437	0.521	0.494	0.499	0.639	0.690	0.721	0.721
IC05	0.377	0.337	0.395	0.393	0.362	0.464	0.470	0.419	0.470
IC72	0.455	0.414	0.497	0.479	0.458	0.660	0.620	0.724	0.724
IC71	0.452	0.410	0.493	0.474	0.453	0.637	0.614	0.716	0.716
IC62	0.428	0.387	0.453	0.444	0.407	0.583	0.536	0.587	0.587
IC61	0.415	0.378	0.445	0.435	0.402	0.553	0.549	0.603	0.603
IC15	0.357	0.316	0.388	0.373	0.352	0.450	0.458	0.392	0.458
IC04	0.347	0.307	0.386	0.368	0.350	0.441	0.451	0.380	0.451
IC14	0.339	0.298	0.383	0.363	0.347	0.436	0.446	0.373	0.446
IC03	0.324	0.289	0.378	0.354	0.343	0.425	0.436	0.361	0.436
IC02	0.315	0.281	0.371	0.351	0.336	0.412	0.425	0.350	0.425
IC01	0.312	0.282	0.370	0.351	0.333	0.404	0.417	0.344	0.417
IC00	0.311	0.282	0.367	0.355	0.330	0.394	0.407	0.333	0.407

Table 19 – Out-of-Plane Maximum Accelerations on Walls Running E-W

			SRSS Acceleration X-Direction (g)								
Group ID	**Max. Load**	**SDOF ID**	**270-200**	**270-500**	**560-100**	**560-200**	**560-500**	**1900-100**	**900-200**	**2032-100**	**Envelope**
FH07x1	2.217	W_N_1a	0.607	0.515	0.820	0.647	0.658	2.217	1.859	2.201	2.217
		W_N_1b	0.597	0.516	0.793	0.640	0.658	2.112	1.772	2.109	2.112
		W_N_1c	0.606	0.522	0.798	0.628	0.654	2.081	1.738	2.077	2.081
		W_N_1d	0.629	0.533	0.824	0.660	0.609	1.908	1.604	1.892	1.908
RE04x1	1.113	W_S_3	0.487	0.419	0.608	0.566	0.530	0.678	0.624	0.684	0.684
		W_S_4	0.491	0.419	0.599	0.562	0.527	0.683	0.626	0.675	0.683
		W_S_5	0.553	0.486	0.771	0.686	0.707	0.992	0.914	1.113	1.113
		W_S_6	0.565	0.497	0.762	0.667	0.687	1.014	0.898	1.062	1.062
		W_P1n	0.503	0.419	0.590	0.561	0.529	0.681	0.625	0.682	0.682
		W_P2n	0.489	0.412	0.591	0.562	0.514	0.648	0.594	0.657	0.657
RE03x1	0.629	W_S_9	0.439	0.395	0.528	0.505	0.474	0.616	0.541	0.599	0.616
		W_S_10	0.439	0.395	0.530	0.504	0.476	0.629	0.558	0.591	0.629
RE02x1	0.578	W_N_3	0.424	0.381	0.510	0.468	0.454	0.578	0.497	0.528	0.578
		W_N_2	0.426	0.386	0.521	0.475	0.467	0.551	0.482	0.521	0.551
RE00x1	0.472	W_S_21	0.415	0.357	0.472	0.427	0.420	0.389	0.414	0.378	0.472
		W_S_22	0.415	0.356	0.472	0.427	0.421	0.388	0.413	0.378	0.472
		W_S_25	0.416	0.357	0.471	0.428	0.421	0.394	0.418	0.381	0.471
		W_S_26	0.415	0.357	0.472	0.428	0.421	0.388	0.413	0.380	0.472

Table 20 – Out-of-Plane Maximum Accelerations on Walls Running N-S

			SRSS Acceleration Y-Direction (g)								
Group ID	**Max. Load**	**SDOF ID**	**270-200**	**270-500**	**560-100**	**560-200**	**560-500**	**900-100**	**900-200**	**2032-100**	**Envelope**
FH07Y1	2.472	W_E_1	0.640	0.524	0.945	0.812	0.901	2.472	2.151	2.112	2.472
RE42Y1	1.854	W_E_2	0.711	0.653	0.855	0.806	0.789	1.379	1.261	1.854	1.854
		W_E_3	0.527	0.468	0.656	0.541	0.541	0.724	0.727	0.746	0.746
RE41Y1	1.451	W_W_2	0.811	0.763	0.811	0.771	0.774	1.101	1.076	1.451	1.451
RE04Y1	0.880	W_E_7	0.533	0.483	0.665	0.573	0.545	0.797	0.820	0.685	0.820
		W_W_1	0.523	0.478	0.656	0.561	0.538	0.782	0.790	0.674	0.790
		W_P1e	0.532	0.482	0.658	0.612	0.587	0.855	0.880	0.842	0.880
		W_P1w	0.532	0.482	0.658	0.612	0.587	0.855	0.880	0.842	0.880
		W_P2e	0.539	0.487	0.660	0.622	0.591	0.859	0.880	0.846	0.880
		W_P2w	0.539	0.487	0.660	0.622	0.591	0.859	0.880	0.846	0.880
RE03Y1	0.649	W_E_4a	0.497	0.456	0.571	0.481	0.474	0.589	0.599	0.642	0.642
		W_E_4b	0.494	0.453	0.570	0.481	0.475	0.580	0.589	0.580	0.589
		W_E_5	0.496	0.458	0.568	0.483	0.480	0.617	0.608	0.638	0.638
		W_W_5	0.501	0.460	0.570	0.483	0.482	0.628	0.620	0.639	0.639
		W_W_6	0.502	0.458	0.572	0.483	0.476	0.601	0.611	0.649	0.649
RE02Y1	0.600	W_W_8	0.465	0.431	0.508	0.436	0.439	0.499	0.501	0.527	0.527
		W_E_6	0.464	0.432	0.510	0.435	0.440	0.495	0.499	0.519	0.519
		W_P3e	0.494	0.452	0.534	0.456	0.451	0.546	0.553	0.600	0.600
RE00Y1	0.467	W_E_8	0.457	0.396	0.390	0.352	0.328	0.467	0.438	0.373	0.467

Table 21 – Out-of-Plane Maximum Accelerations of SDOF Slabs Vertical

			SRSS Acceleration Z-Direction (g)								
Group ID	**Max. Load**	**SDOF ID**	**270-200**	**270-500**	**560-100**	**560-200**	**560-500**	**900-100**	**900-200**	**2032-100**	**Envelope**
FH08Z1	3.692	115_10a	1.035	0.955	1.107	1.074	1.129	3.692	2.818	3.327	3.692
		115_10b	0.916	0.843	0.984	0.944	0.996	3.225	2.554	2.941	3.225
		115_10c	0.861	0.859	0.908	0.936	0.990	2.930	2.242	2.752	2.930
		115_10d	0.947	0.908	1.010	0.955	1.012	2.917	2.020	2.804	2.917
		115_10e	0.990	0.936	0.984	0.904	0.971	2.569	1.739	2.550	2.569
RE05Z2	2.416	115_30	0.936	0.871	1.073	0.940	1.024	2.175	1.862	2.416	2.416
		115_30a	0.992	0.923	1.029	1.015	1.032	2.009	1.831	2.380	2.380
		115_30b	0.885	0.827	0.870	0.873	0.882	1.800	1.502	1.976	1.976
		115_30c	0.813	0.753	0.881	0.831	0.857	1.771	1.609	2.063	2.063
RE05Z1	1.575	115_31	0.658	0.641	0.780	0.723	0.728	1.244	1.210	1.355	1.355
		115_32	0.749	0.715	0.884	0.825	0.827	1.425	1.424	1.575	1.575
		115_33a	0.690	0.618	0.617	0.590	0.584	1.268	1.045	1.374	1.374
		115_33b	0.776	0.701	0.678	0.652	0.670	1.366	1.070	1.562	1.562
		115_33c	0.619	0.573	0.675	0.594	0.597	1.456	1.253	1.538	1.538
		115_33d	0.626	0.580	0.658	0.608	0.603	1.475	1.276	1.571	1.571
		115_40	0.700	0.678	0.811	0.765	0.767	1.242	1.235	1.378	1.378
RE41Z1	2.205	101_10a	0.954	0.883	0.877	0.903	0.902	2.205	1.589	2.167	2.205
		101_10b	0.783	0.693	0.698	0.697	0.712	1.334	1.106	1.433	1.433

Table 21 – Out-of-Plane Maximum Accelerations of SDOF Slabs Vertical - Cont'd

			SRSS Acceleration Z-Direction (g)								
Group ID	**Max. Load**	**SDOF ID**	**270-200**	**270-500**	**560-100**	**560-200**	**560-500**	**900-100**	**900-200**	**2032-100**	**Envelope**
RE41Z3	2.014	101_12b	0.679	0.581	0.689	0.692	0.683	1.613	1.295	1.676	1.676
		101_41b	0.787	0.709	0.780	0.788	0.783	1.906	1.476	1.999	1.999
		101_43a	0.801	0.714	0.754	0.778	0.761	1.900	1.497	2.014	2.014
RE41Z2	1.180	101_11	0.576	0.508	0.576	0.581	0.577	1.180	1.015	1.163	1.180
		101_40	0.496	0.474	0.549	0.552	0.542	1.061	0.950	0.982	1.061
		101_41a	0.524	0.505	0.626	0.615	0.609	1.070	0.945	1.037	1.070
RE42Z1	3.087	101_21	0.942	0.874	0.976	0.957	1.012	3.087	2.618	2.580	3.087
		101_22	0.995	0.913	0.795	0.858	0.833	1.299	1.225	1.881	1.881
		101_23	0.993	0.917	0.961	0.958	0.965	2.092	1.562	2.171	2.171
		101_23a	0.822	0.738	0.673	0.700	0.690	1.080	1.053	1.500	1.500
		101_24a	0.695	0.614	0.652	0.641	0.618	0.957	0.939	1.223	1.223
RE04Z1	1.174	101_30	0.568	0.522	0.639	0.641	0.602	0.955	0.942	1.174	1.174
		101_30a	0.526	0.493	0.611	0.606	0.575	0.942	0.929	1.011	1.011
		101_33a	0.586	0.523	0.674	0.633	0.625	1.095	1.052	1.141	1.141
RE03Z1	1.317	86_17b	0.697	0.613	0.604	0.578	0.571	0.991	0.800	1.226	1.226
		76_33b	0.600	0.575	0.703	0.652	0.648	1.301	1.104	1.303	1.303
		76_43b	0.594	0.577	0.704	0.646	0.646	1.274	1.066	1.317	1.317

Table 21 – Out-of-Plane Maximum Accelerations of SDOF Slabs Vertical - Cont'd

			SRSS Acceleration Z-Direction (g)								
Group ID	**Max. Load**	**SDOF ID**	**270-200**	**270-500**	**560-100**	**560-200**	**560-500**	**900-100**	**900-200**	**2032-100**	**Envelope**
RE03Z2	1.218	86_14	0.562	0.513	0.599	0.564	0.548	0.800	0.775	0.903	0.903
		76_10b	0.566	0.516	0.601	0.565	0.549	0.805	0.777	0.907	0.907
		76_13	0.511	0.453	0.521	0.504	0.485	0.689	0.624	0.850	0.850
		76_21g	0.704	0.622	0.702	0.641	0.640	1.054	0.926	1.218	1.218
		76_43a	0.497	0.459	0.580	0.508	0.527	0.898	0.841	0.940	0.940
RE03Z3	0.916	86_16	0.465	0.423	0.534	0.515	0.476	0.714	0.674	0.756	0.756
		76_10c	0.451	0.412	0.522	0.502	0.467	0.712	0.671	0.747	0.747
		76_11a	0.533	0.484	0.616	0.562	0.548	0.882	0.853	0.916	0.916
		76_20a	0.453	0.435	0.563	0.525	0.503	0.737	0.715	0.779	0.779
RE03Z4	0.901	76_10a	0.494	0.443	0.554	0.522	0.497	0.718	0.713	0.724	0.724
		76_30a	0.445	0.413	0.539	0.505	0.484	0.746	0.721	0.694	0.746
		76_30b	0.421	0.396	0.524	0.488	0.471	0.735	0.712	0.647	0.735
		76_30c	0.420	0.395	0.523	0.485	0.470	0.734	0.710	0.649	0.734
		76_31b	0.388	0.355	0.476	0.436	0.427	0.737	0.682	0.701	0.737
		76_33a	0.474	0.429	0.566	0.515	0.505	0.901	0.834	0.866	0.901
		76_40a	0.459	0.411	0.517	0.483	0.463	0.725	0.714	0.688	0.725
		76_41c	0.386	0.350	0.469	0.429	0.420	0.728	0.679	0.700	0.728

Table 21 – Out-of-Plane Maximum Accelerations of SDOF Slabs Vertical - Cont'd

			SRSS Acceleration Z-Direction (g)								
Group ID	**Max. Load**	**SDOF ID**	**270-200**	**270-500**	**560-100**	**560-200**	**560-500**	**900-100**	**900-200**	**2032-100**	**Envelope**
RE02Z1	1.059	50_21b	0.625	0.551	0.623	0.598	0.586	0.919	0.843	1.059	1.059
		50_21c	0.591	0.517	0.589	0.570	0.560	0.887	0.806	1.027	1.027
		50_21d	0.549	0.482	0.564	0.543	0.533	0.814	0.759	0.932	0.932
		50_21e	0.528	0.472	0.549	0.527	0.519	0.815	0.747	0.922	0.922
RE02Z2	0.819	50_20b	0.538	0.492	0.579	0.553	0.540	0.697	0.664	0.734	0.734
		50_22a	0.454	0.410	0.496	0.476	0.455	0.622	0.582	0.623	0.623
		50_33d	0.560	0.521	0.610	0.570	0.559	0.796	0.803	0.819	0.819
		50_43d	0.542	0.500	0.558	0.531	0.502	0.769	0.741	0.794	0.794
RE02Z3	0.679	50_30a	0.425	0.419	0.530	0.509	0.477	0.633	0.622	0.584	0.633
		50_30b	0.459	0.452	0.560	0.541	0.503	0.679	0.669	0.658	0.679
		50_40b	0.457	0.418	0.526	0.500	0.464	0.651	0.659	0.615	0.659
RE02Z4	0.767	50_10b	0.434	0.393	0.489	0.462	0.443	0.644	0.627	0.563	0.644
		50_32c	0.458	0.410	0.517	0.478	0.464	0.752	0.707	0.716	0.752
		50_34	0.448	0.400	0.484	0.448	0.435	0.740	0.686	0.740	0.740
		50_42e	0.450	0.412	0.509	0.461	0.462	0.738	0.699	0.766	0.766
		50_44	0.446	0.401	0.485	0.442	0.430	0.732	0.684	0.767	0.767
		35_26	0.452	0.439	0.559	0.524	0.502	0.665	0.666	0.591	0.666

Table 21 – Out-of-Plane Maximum Accelerations of SDOF Slabs Vertical - Cont'd

			SRSS Acceleration Z-Direction (g)								
Group ID	**Max. Load**	**SDOF ID**	**270-200**	**270-500**	**560-100**	**560-200**	**560-500**	**900-100**	**900-200**	**2032-100**	**Envelope**
RE01Z1	0.629	25_30b	0.436	0.413	0.497	0.487	0.447	0.499	0.508	0.490	0.508
		25_33b	0.452	0.422	0.500	0.491	0.454	0.516	0.536	0.587	0.587
		25_42d	0.529	0.497	0.556	0.558	0.502	0.580	0.595	0.629	0.629
RE01Z2	0.683	25_33d	0.457	0.409	0.466	0.448	0.440	0.634	0.594	0.663	0.663
		25_34b	0.434	0.405	0.511	0.476	0.464	0.625	0.613	0.600	0.625
		25_43d	0.473	0.432	0.489	0.475	0.463	0.650	0.616	0.683	0.683
		25_44b	0.445	0.414	0.520	0.484	0.475	0.634	0.626	0.611	0.634
RE01Z3	0.690	25_20b	0.440	0.415	0.482	0.466	0.457	0.655	0.639	0.622	0.655
		25_20d	0.479	0.451	0.509	0.498	0.488	0.685	0.668	0.649	0.685
		25_20e	0.457	0.430	0.492	0.479	0.469	0.652	0.639	0.593	0.652
		25_20f	0.506	0.473	0.528	0.517	0.508	0.690	0.678	0.656	0.690
RE01Z4	0.763	25_20a	0.452	0.410	0.473	0.466	0.454	0.597	0.589	0.603	0.603
		13_31	0.601	0.559	0.611	0.603	0.583	0.664	0.690	0.763	0.763
		13_42	0.530	0.484	0.542	0.520	0.509	0.685	0.658	0.714	0.714
RE01Z5	0.601	25_20c	0.399	0.373	0.452	0.429	0.418	0.556	0.551	0.487	0.556
		25_23	0.406	0.387	0.476	0.458	0.432	0.524	0.529	0.444	0.529
		25_22e	0.405	0.380	0.463	0.437	0.424	0.545	0.547	0.472	0.547
		13_17	0.445	0.404	0.466	0.449	0.438	0.601	0.590	0.511	0.601

Table 21 – Out-of-Plane Maximum Accelerations of SDOF Slabs Vertical - Cont'd

			SRSS Acceleration Z-Direction (g)								
Group ID	**Max. Load**	**SDOF ID**	**270-200**	**270-500**	**560-100**	**560-200**	**560-500**	**900-100**	**900-200**	**2032-100**	**Envelope**
RE00Z1	0.514	3_32a	0.471	0.434	0.471	0.464	0.446	0.465	0.467	0.514	0.514
		3_32d	0.470	0.434	0.474	0.467	0.449	0.460	0.474	0.511	0.511
RE00Z2	0.545	3_32b	0.416	0.380	0.449	0.424	0.421	0.545	0.532	0.527	0.545
		3_32c	0.415	0.379	0.447	0.420	0.420	0.543	0.532	0.527	0.543
RE00Z3	0.483	3_10a	0.443	0.407	0.469	0.456	0.429	0.457	0.482	0.427	0.482
		3_20a	0.453	0.419	0.464	0.461	0.430	0.453	0.483	0.449	0.483
		3_15c	0.396	0.369	0.436	0.421	0.398	0.461	0.480	0.394	0.480
		3_15d	0.386	0.360	0.428	0.415	0.390	0.458	0.477	0.393	0.477
		3_15	0.394	0.368	0.425	0.418	0.389	0.457	0.479	0.398	0.479
BS01Z1	0.495	n8_10a	0.396	0.366	0.434	0.415	0.395	0.446	0.469	0.386	0.469
		n8_11c	0.458	0.427	0.482	0.468	0.437	0.465	0.495	0.408	0.495
		n8_16	0.398	0.371	0.436	0.429	0.394	0.460	0.479	0.402	0.479
BS01Z2	0.505	n8_13	0.468	0.433	0.488	0.472	0.453	0.479	0.505	0.431	0.505
		n8_14b	0.430	0.400	0.461	0.452	0.423	0.470	0.491	0.423	0.491
		n8_21c	0.449	0.413	0.462	0.459	0.426	0.460	0.489	0.440	0.489
		n8_22a	0.390	0.360	0.417	0.412	0.379	0.438	0.463	0.383	0.463
		n8_30a	0.390	0.360	0.413	0.405	0.374	0.400	0.419	0.388	0.419
		n8_40a	0.394	0.365	0.425	0.406	0.386	0.408	0.430	0.378	0.430

Table 22 – Enveloped Forces for PCCV

	Envelope (all units in kip and feet)						Story Force		
	Tns	Tew	Pv	Mns	Mew	Tor	Tns'	Tew'	Pv'
CV11	1,585	2,086	1,228	351	421	251	1,597	2,129	1,907
CV10	7,220	9,465	5,607	19,363	23,172	13,923	7,378	9,838	6,558
CV09	12,732	16,332	8,296	94,542	115,156	68,988	13,275	17,180	10,152
CV08	12,325	15,411	7,692	145,307	180,077	107,339	13,161	16,557	8,916
CV07	15,257	18,130	10,110	209,663	259,101	153,272	16,661	19,637	11,306
CV06	9,644	11,060	6,850	143,452	175,057	100,767	10,419	12,231	7,248
CV05	6,811	7,450	5,101	92,290	127,029	70,627	7,529	8,282	5,270
CV04	3,726	3,830	2,861	48,158	69,012	37,044	4,175	4,407	3,247
CV03	3,321	3,543	2,589	44,009	61,009	32,152	3,766	3,987	5,316
CV02	4,530	4,544	3,801	60,007	80,003	39,749	5,090	5,090	3,999
CV01	3,941	3,380	3,777	50,036	67,010	23,725	4,527	4,115	4,115

* Please note the story forces in this table are adjusted to reflect the contributions from moments along with the consideration of conservative margins.

Table 23 – Enveloped Forces for CIS

	Envelope (all units in kip and feet)						Story Force		
	Tns	Tew	Pv	Mns	Mew	Tor	Tns'	Tew'	Pv'
IC09	2,809	2,090	558	1,999	2,253	506	2,864	2,112	1,360
IC18	4,070	3,894	1,491	9,664	8,671	1,778	4,160	4,056	3,536
IC08	636	628	249	782	932	519	650	650	547
IC05	8,834	12,661	7,521	135,295	157,823	435,371	12,079	16,609	10,569
IC72	1,112	1,066	585	6,966	3,320	12,875	2,002	1,797	1,185
IC71	1,515	1,532	753	8,102	4,141	16,693	2,496	2,184	1,508
IC62	4,001	4,043	1,453	16,055	10,679	6,497	4,212	4,212	2,808
IC61	3,160	3,069	1,130	4,819	7,108	3,554	3,300	3,190	2,200
IC15	110	120	101	1,443	1,602	877	1,265	264	132
IC04	7,188	7,211	6,710	76,499	66,395	34,398	8,195	8,195	8,195
IC14	1,170	917	170	1,227	1,011	9,318	1,253	1,094	177
IC03	6,217	6,421	5,538	28,845	23,043	20,006	6,631	7,073	5,747
IC02	8,676	7,910	11,101	134,843	108,045	140,944	10,440	10,440	11,310
IC01	8,902	8,350	7,716	95,218	54,001	103,965	10,175	10,175	9,250

* Please note the story forces in this table are adjusted to reflect the contributions from moments along with the consideration of conservative margins.

Table 24 – Enveloped Forces for R/B and FH/A

	Envelope (all units in kip and feet)						Story Force		
	Tns	Tew	Pv	Mns	Mew	Tor	Tns'	Tew'	Pv'
FH08	15,786	9,225	8,229	42,555	156,544	44,763	16,219	10,261	9,599
FH07	8,934	5,679	4,040	37,025	75,378	34,438	9,291	6,357	7,091
RE05	14,303	17,484	17,730	227,488	630,620	223,415	15,939	18,596	18,216
FH06	3,510	3,618	3,613	17,478	82,512	43,165	3,978	4,680	4,446
RE41	12,218	7,380	9,413	252,740	185,099	257,406	15,120	10,395	9,923
RE42	6,642	4,422	6,044	272,135	70,261	246,526	9,867	5,693	6,452
RE04	8,477	15,550	14,152	33,859	455,949	81,737	9,960	16,600	14,940
RE03	35,046	39,886	37,930	5,355,388	2,006,693	2,421,894	50,775	50,775	44,005
RE02	37,344	36,992	34,920	1,960,274	1,205,411	315,053	39,820	43,440	39,820
RE01	33,003	30,301	30,164	860,557	705,391	777,629	37,730	37,730	34,300

* Please note the story forces in this table are adjusted to reflect the contributions from moments along with the consideration of conservative margins.

Table 25 – Maximum Accelerations for PS/B X-Dir.

	SRSS Acceleration NS Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
Roof Elev. 39'-6"	0.683	0.601	0.868	0.634	0.759	0.981	0.965	0.922	0.981
Ground Floor Elev. 3'-7"	0.509	0.488	0.445	0.439	0.431	0.573	0.582	0.580	0.582
Basemat Elev. 26'-4"	0.407	0.396	0.369	0.363	0.358	0.365	0.347	0.332	0.407

Table 26 – Maximum Accelerations for PS/B Y-Dir.

	SRSS Acceleration EW Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
Roof Elev. 39'-6"	0.553	0.532	0.690	0.545	0.619	0.931	0.852	0.848	0.931
Ground Floor Elev. 3'-7"	0.434	0.414	0.487	0.428	0.451	0.507	0.528	0.461	0.528
Basemat Elev. 26'-4"	0.357	0.350	0.380	0.345	0.356	0.348	0.366	0.330	0.380

Table 27 – Maximum Accelerations for PS/B Z-Dir.

	SRSS Acceleration Vertical Direction (g)								
	270-200	270-500	560-100	560-200	560-500	900-100	900-200	2032-100	Envelope
Roof Elev. 39'-6"	0.481	0.465	0.519	0.474	0.489	0.710	0.653	0.682	0.710
Ground Floor Elev. 3'-7"	0.408	0.391	0.416	0.387	0.387	0.396	0.395	0.397	0.416
Basemat Elev. 26'-4"	0.380	0.365	0.381	0.361	0.358	0.330	0.335	0.312	0.381

Table 28 – Maximum Displacements for PS/B (270 Cases)

Location		270-200			270-500		
		SRSS			SRSS		
Symbol	Node No.	NS (x) Disp (in)	EW (y) Disp (in)	Vert. (z) Disp (in)	NS (x) Disp (in)	EW (y) Disp (in)	Vert. (z) Disp (in)
BM08	495	0.128	0.112	0.106	0.131	0.104	0.102
BM09	507	0.128	0.112	0.106	0.131	0.104	0.102
BM10	729	0.118	0.110	0.099	0.121	0.103	0.095
BM11	741	0.123	0.107	0.107	0.126	0.105	0.103
SF00	1296	0.231	0.162	0.118	0.228	0.159	0.113
SF01	1308	0.231	0.165	0.119	0.228	0.162	0.114
SF02	1530	0.231	0.165	0.119	0.228	0.162	0.114
SF03	1542	0.230	0.165	0.121	0.226	0.163	0.116
SF20	1918	0.370	0.230	0.125	0.353	0.228	0.119
SF23	2158	0.370	0.233	0.126	0.357	0.231	0.120
SF26	2263	0.393	0.243	0.128	0.373	0.241	0.121
SF27	2379	0.407	0.249	0.126	0.391	0.246	0.120

Table 29 – Maximum Displacements for PS/B (560 Cases)

Location		560-100			560-200			560-500		
		SRSS			SRSS			SRSS		
Symbol	Node No.	NS (x) Disp (in)	EW (y) Disp (in)	Vert. (z) Disp (in)	NS (x) Disp (in)	EW (y) Disp (in)	Vert. (z) Disp (in)	NS (x) Disp (in)	EW (y) Disp (in)	Vert. (z) Disp (in)
BM08	495	0.069	0.065	0.063	0.074	0.066	0.064	0.062	0.057	0.058
BM09	507	0.069	0.065	0.063	0.074	0.066	0.064	0.062	0.057	0.058
BM10	729	0.065	0.064	0.056	0.068	0.065	0.058	0.056	0.057	0.052
BM11	741	0.070	0.066	0.065	0.072	0.066	0.065	0.060	0.058	0.060
SF00	1296	0.147	0.106	0.076	0.137	0.106	0.074	0.127	0.097	0.069
SF01	1308	0.147	0.109	0.077	0.137	0.109	0.075	0.126	0.099	0.070
SF02	1530	0.147	0.109	0.077	0.137	0.109	0.075	0.126	0.099	0.070
SF03	1542	0.152	0.110	0.080	0.137	0.109	0.078	0.131	0.100	0.073
SF20	1918	0.255	0.159	0.083	0.219	0.155	0.081	0.223	0.144	0.076
SF23	2158	0.268	0.162	0.086	0.225	0.157	0.082	0.234	0.146	0.078
SF26	2263	0.272	0.171	0.086	0.233	0.165	0.083	0.238	0.153	0.079
SF27	2379	0.298	0.174	0.086	0.249	0.168	0.083	0.261	0.156	0.078

Table 30 – Maximum Displacements for PS/B (900 Cases)

Location		900-100			900-200		
		SRSS			SRSS		
Symbol	Node No.	NS (x) Disp (in)	EW (y) Disp (in)	Vert. (z) Disp (in)	NS (x) Disp (in)	EW (y) Disp (in)	Vert. (z) Disp (in)
BM08	495	0.100	0.081	0.018	0.101	0.084	0.019
BM09	507	0.100	0.081	0.018	0.101	0.084	0.019
BM10	729	0.099	0.080	0.014	0.100	0.083	0.015
BM11	741	0.100	0.081	0.020	0.101	0.084	0.021
SF00	1296	0.117	0.110	0.031	0.121	0.115	0.032
SF01	1308	0.117	0.113	0.032	0.121	0.117	0.032
SF02	1530	0.117	0.113	0.032	0.121	0.117	0.032
SF03	1542	0.123	0.114	0.036	0.127	0.118	0.037
SF20	1918	0.148	0.149	0.039	0.152	0.154	0.039
SF23	2158	0.159	0.152	0.042	0.164	0.157	0.042
SF26	2263	0.152	0.158	0.042	0.157	0.163	0.041
SF27	2379	0.168	0.159	0.044	0.181	0.164	0.044

Table 31 – Maximum Displacements for PS/B (2032-100)

Location		2032-100		
		SRSS		
Symbol	Node No.	NS (x) Disp (in)	EW (y) Disp (in)	Vert. (z) Disp (in)
BM08	495	0.099	0.074	0.010
BM09	507	0.099	0.074	0.010
BM10	729	0.099	0.073	0.008
BM11	741	0.100	0.074	0.011
SF00	1296	0.107	0.101	0.022
SF01	1308	0.107	0.103	0.022
SF02	1530	0.107	0.103	0.022
SF03	1542	0.111	0.104	0.026
SF20	1918	0.127	0.137	0.029
SF23	2158	0.136	0.139	0.031
SF26	2263	0.130	0.145	0.031
SF27	2379	0.142	0.146	0.033

Appendix H

Maximum Acceleration Bubble Plots for PS/B

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*Note: All seismic demands are in units of (g). They are combined ZPA's (Zero Period Accelerations) for three direction earthquake excitations using SRSS rule and envelop of all soil profiles. Refer to Section 3.6.2 of this report for the methodology / procedure to develop the seismic demands (ZPA's).

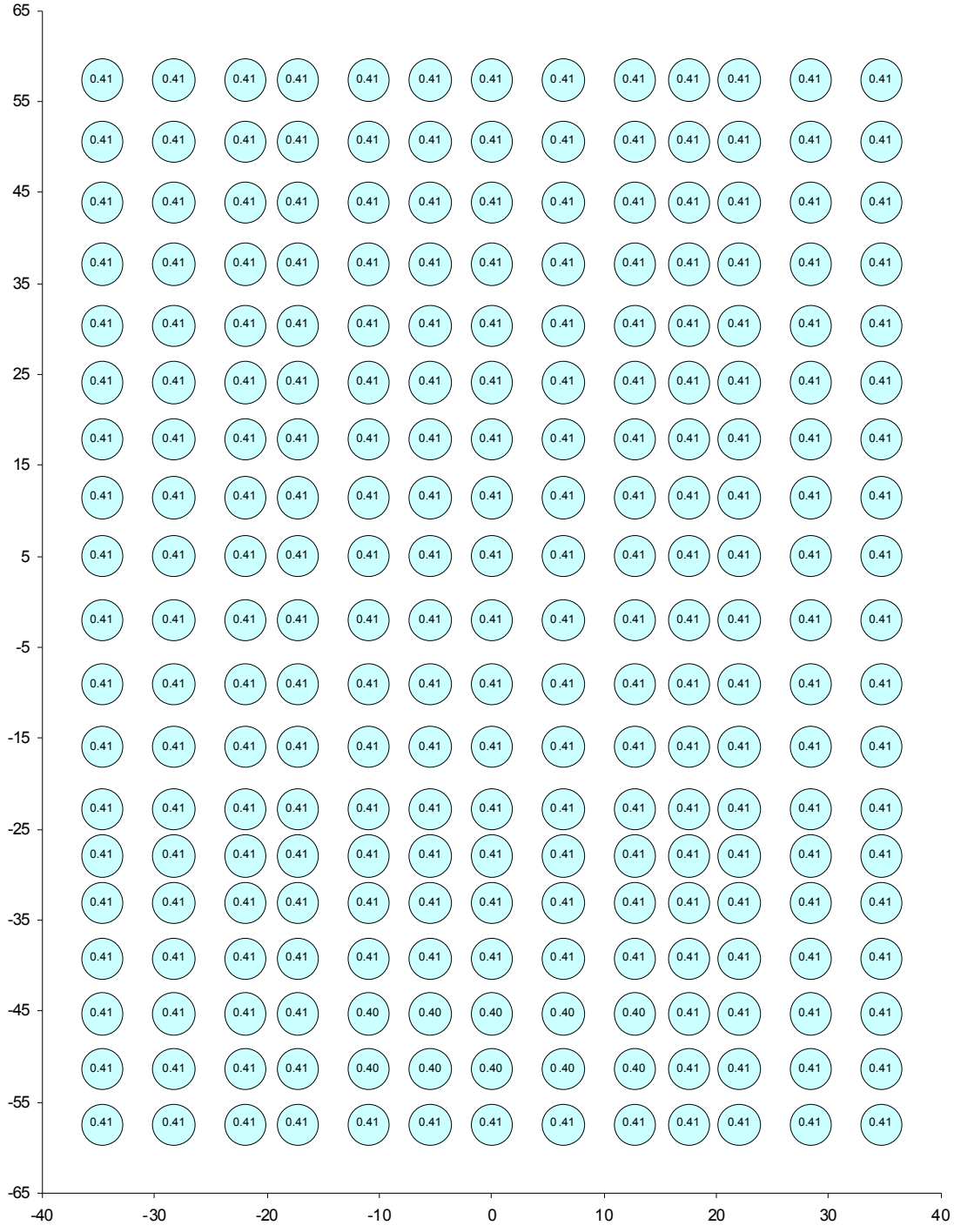

Figure 1 – Top of Basemat – Seismic Demand Bubble Plot SRSS N-S Direction – Elev. -26'-4"

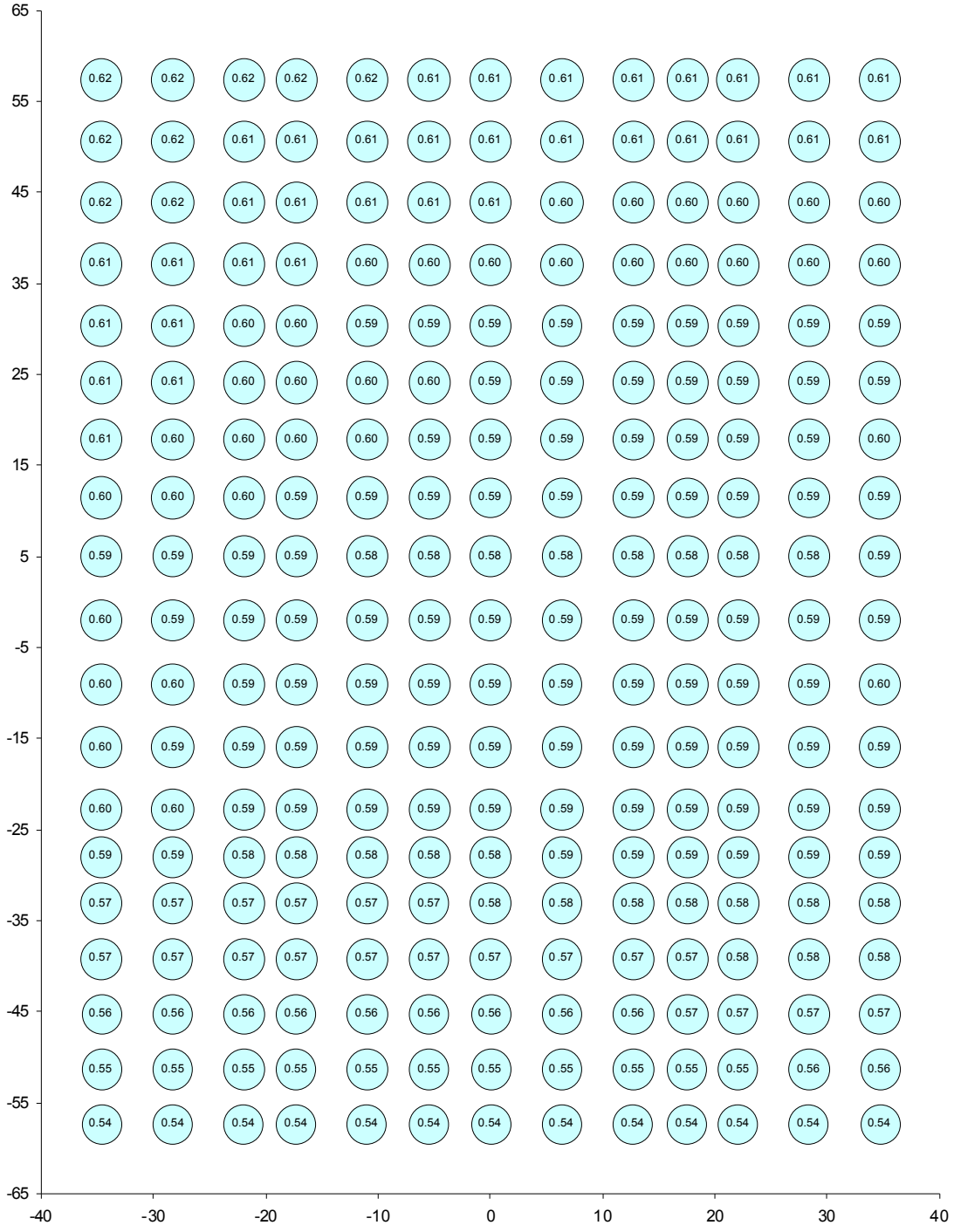

Figure 2 – Ground – Seismic Demand Bubble Plot SRSS N-S Direction – Elev. 3’-7”

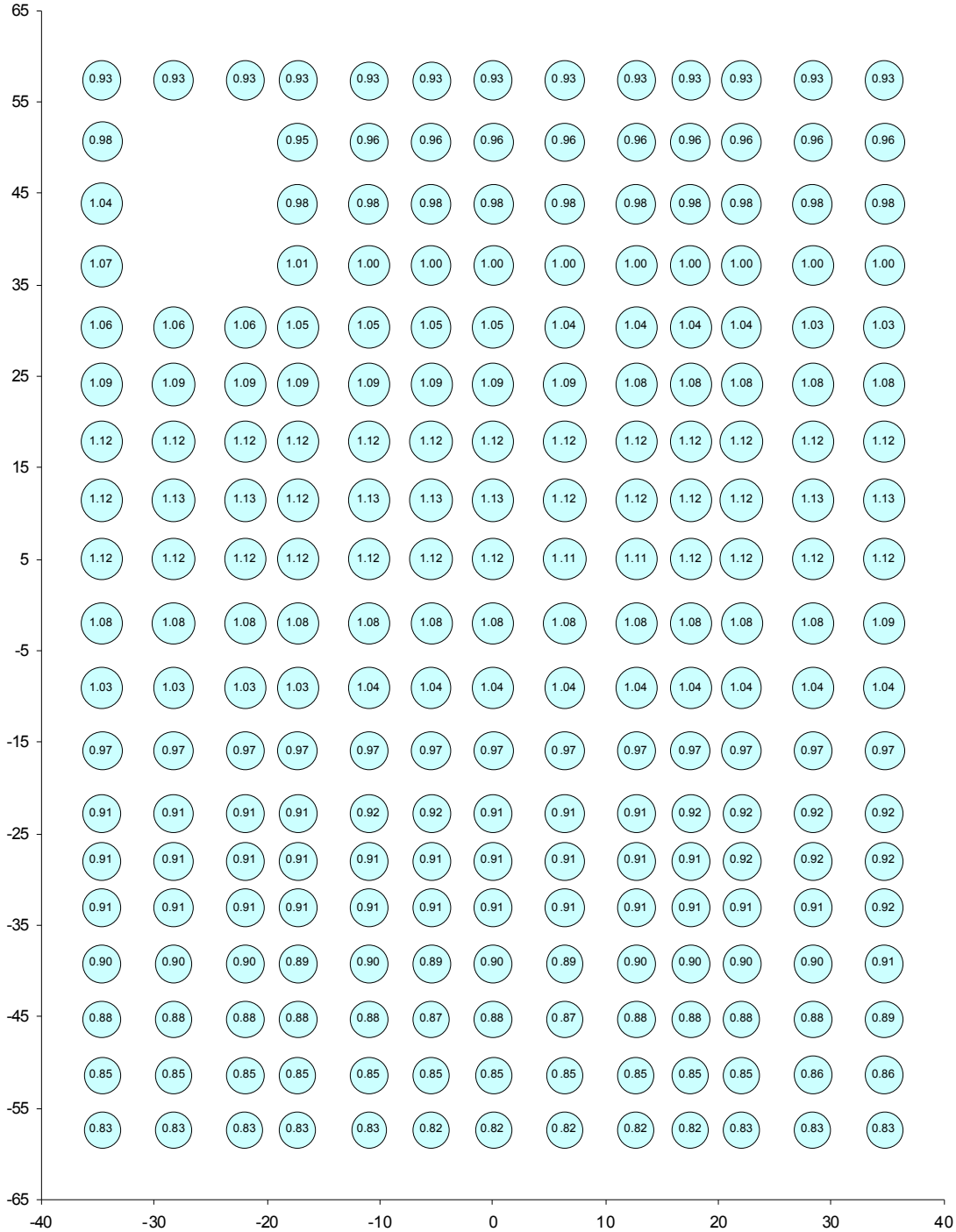

Figure 3 – Roof – Seismic Demand Bubble Plot SRSS N-S Direction – Elev. 39’-6”

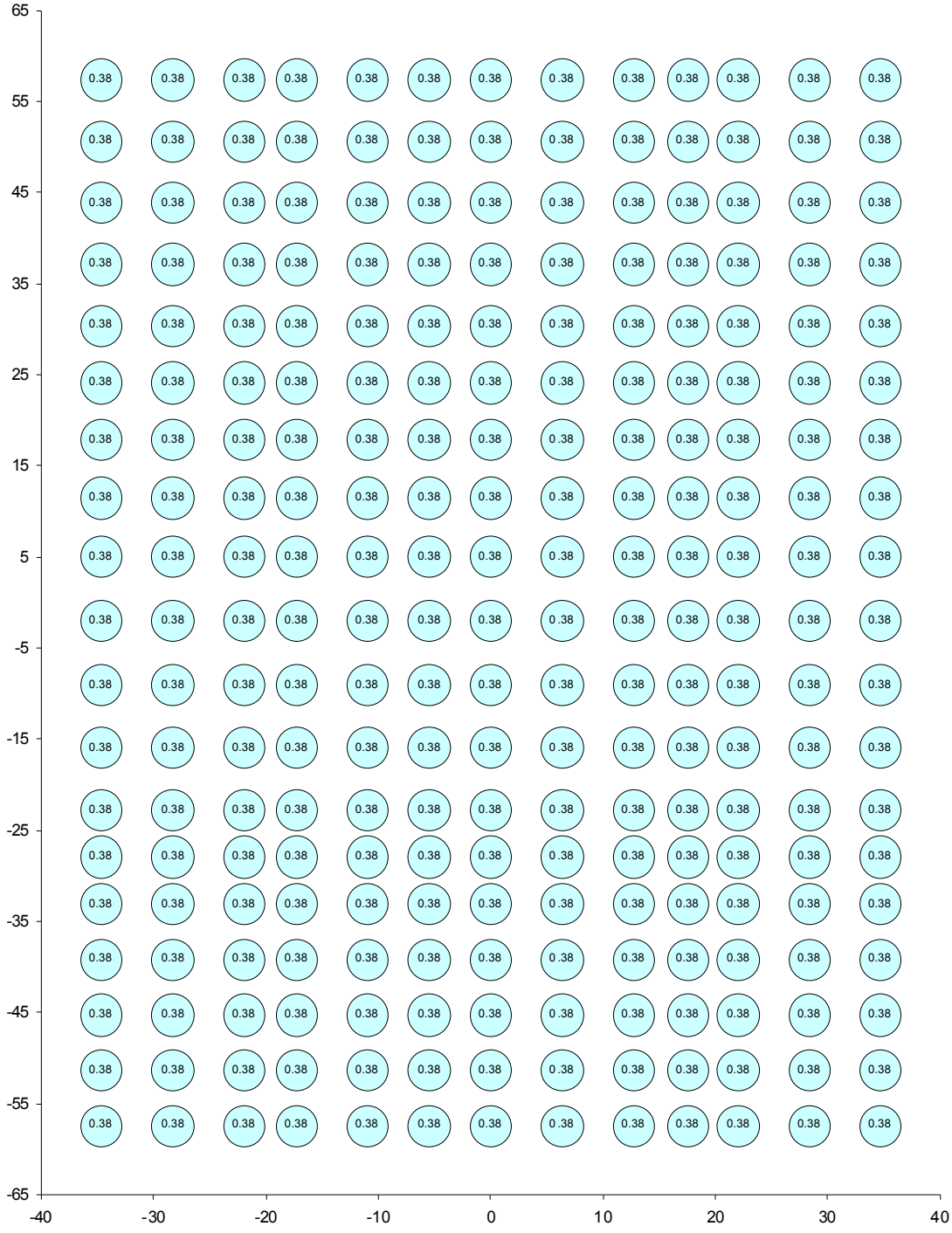

Figure 4 – Top of Basemat – Seismic Demand Bubble Plot SRSS E-W Direction – Elev. -26'-4"

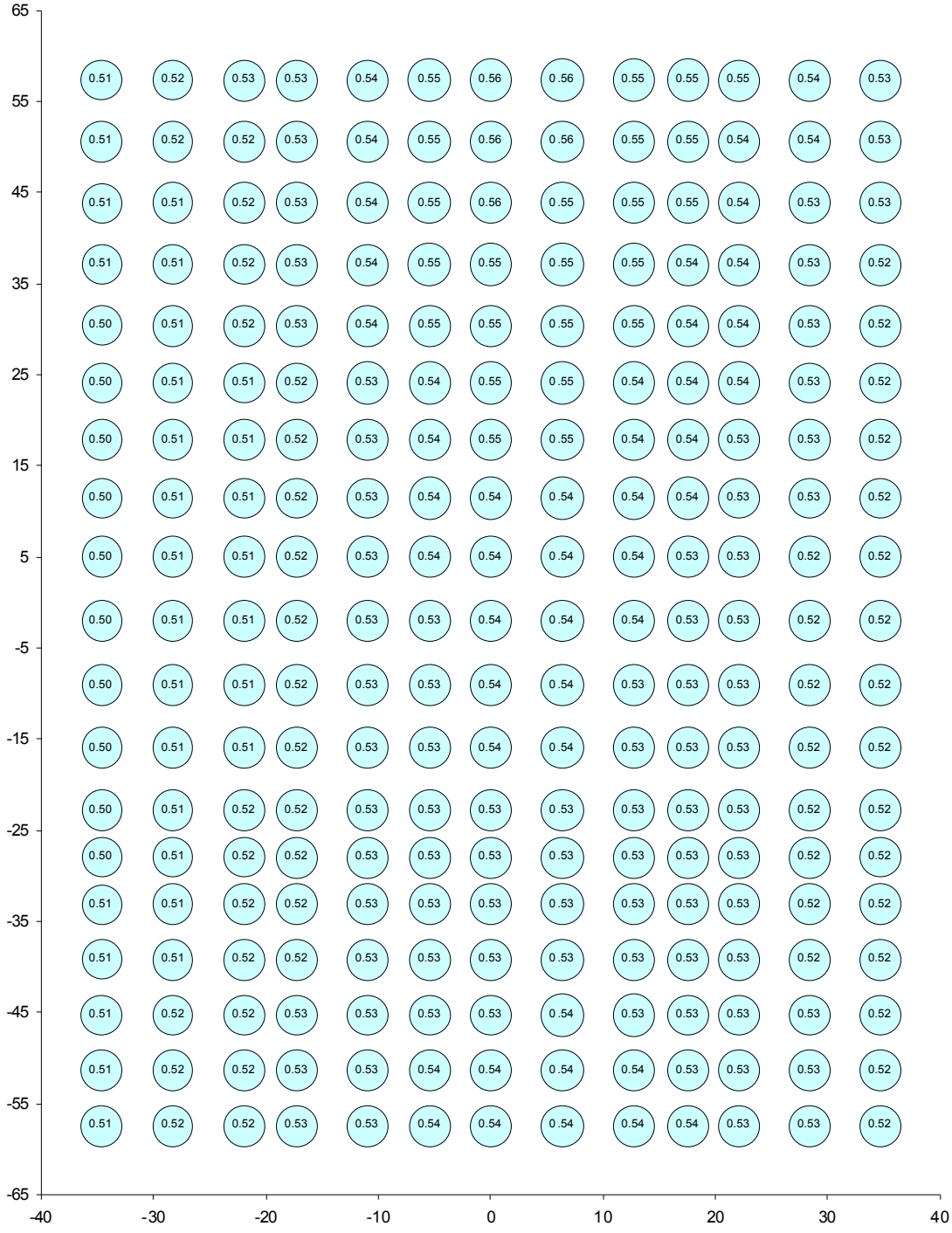

Figure 5 – Ground – Seismic Demand Bubble Plot SRSS E-W Direction – Elev. 3’-7”

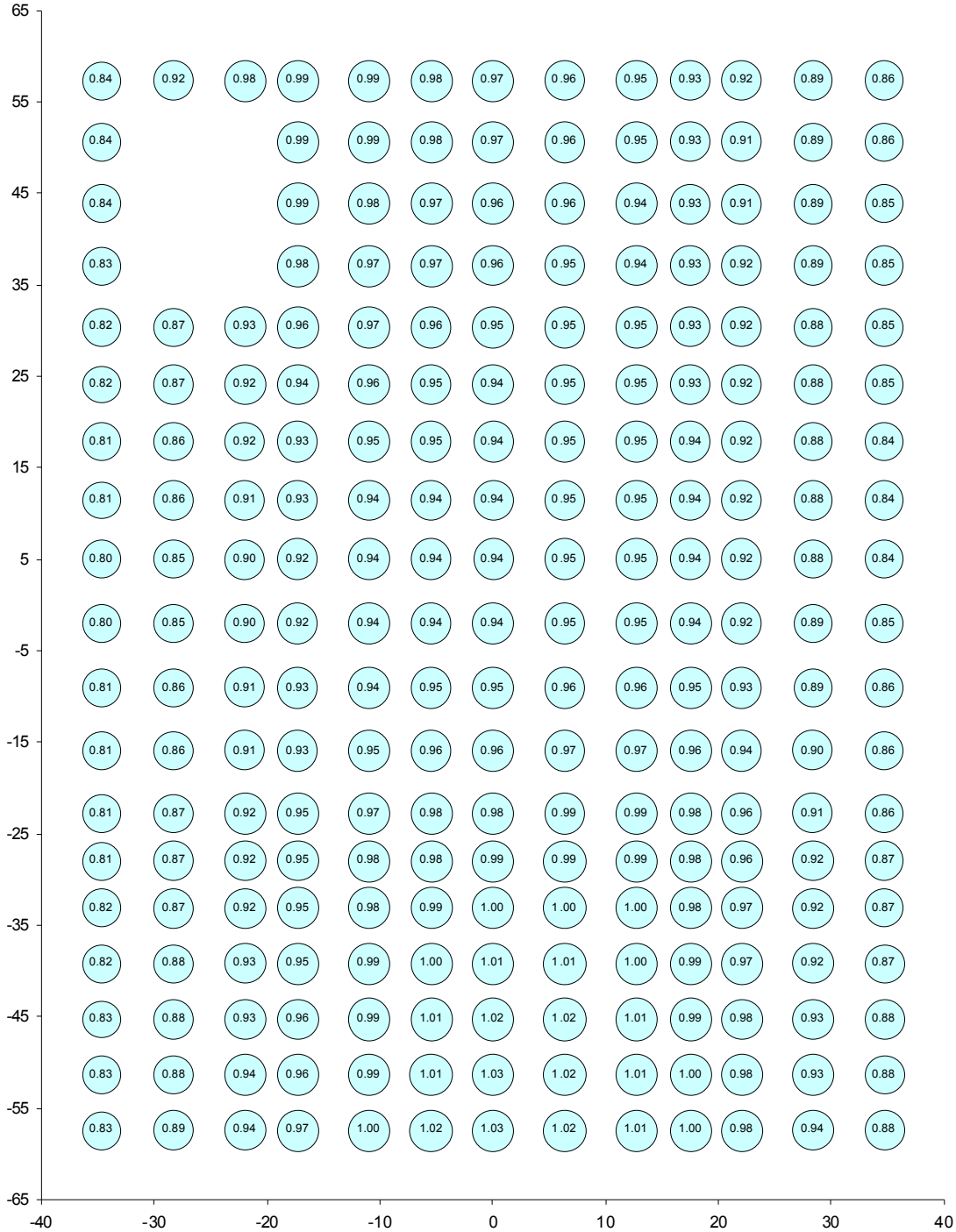

Figure 6 – Roof – Seismic Demand Bubble Plot SRSS E-W Direction – Elev. 39’-6”

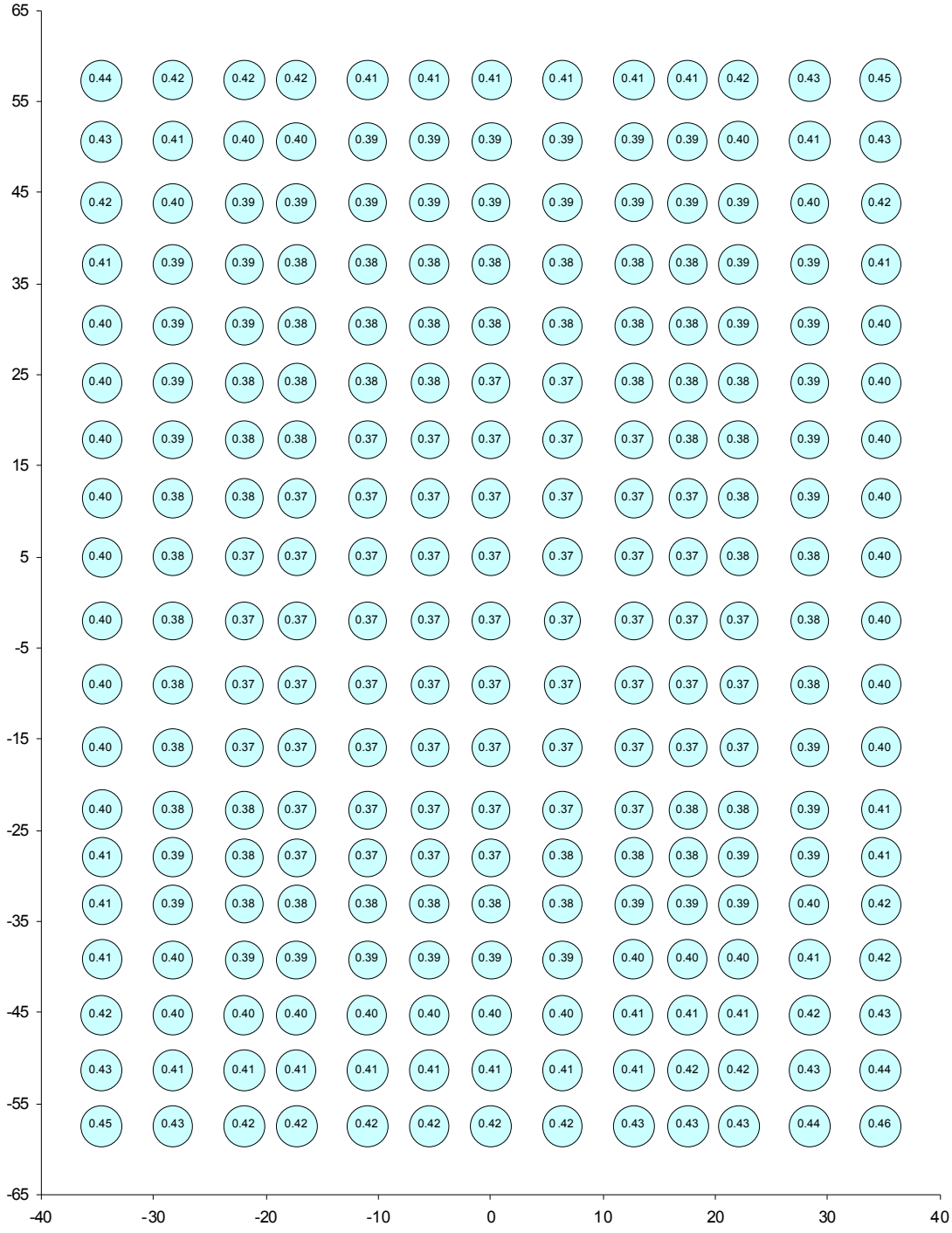

Figure 7 – Top of Basemat – Seismic Demand Bubble Plot SRSS Vertical Direction – Elev. -26’-4”

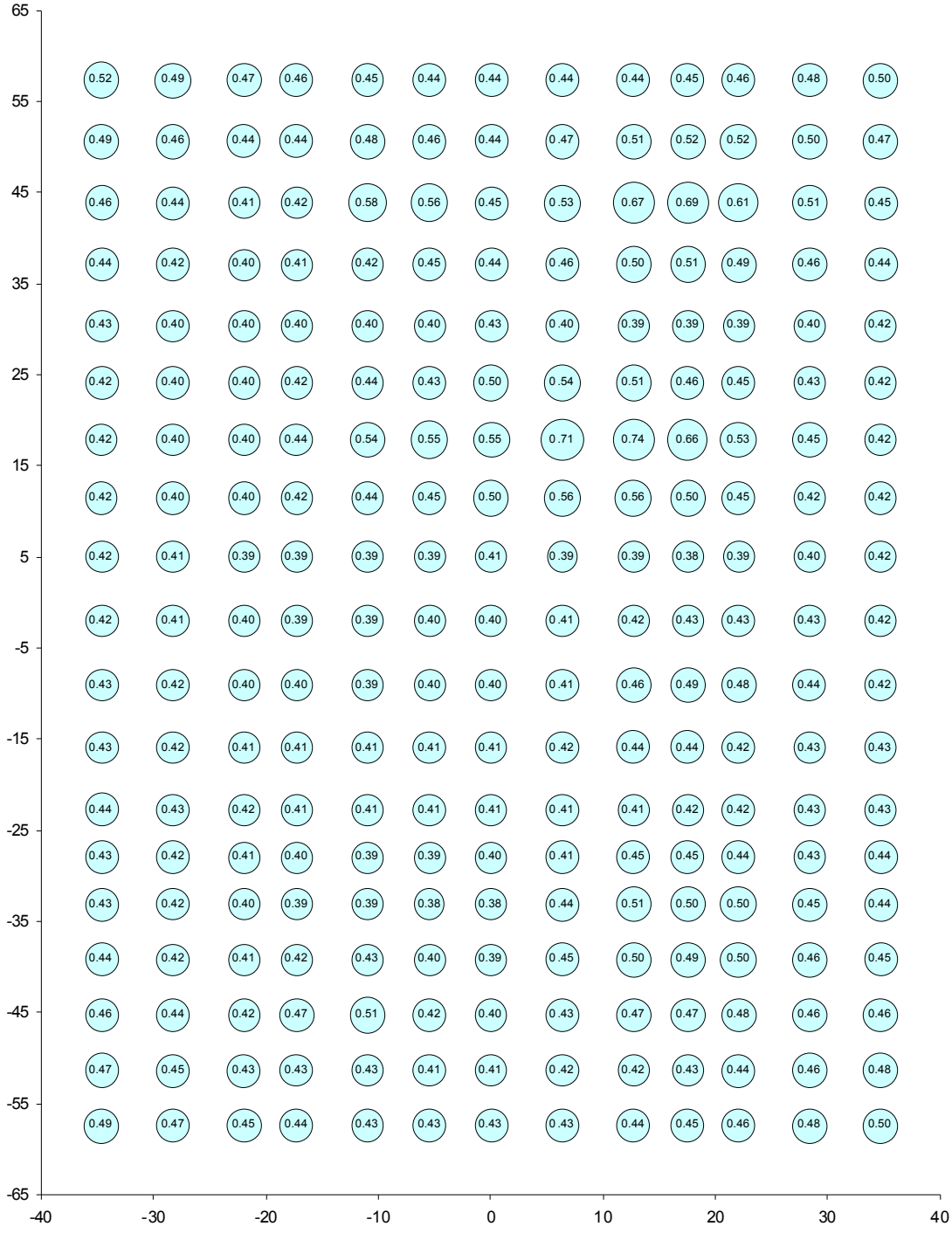

Figure 8 – Ground – Seismic Demand Bubble Plot SRSS Vertical Direction – Elev. 3’-7”

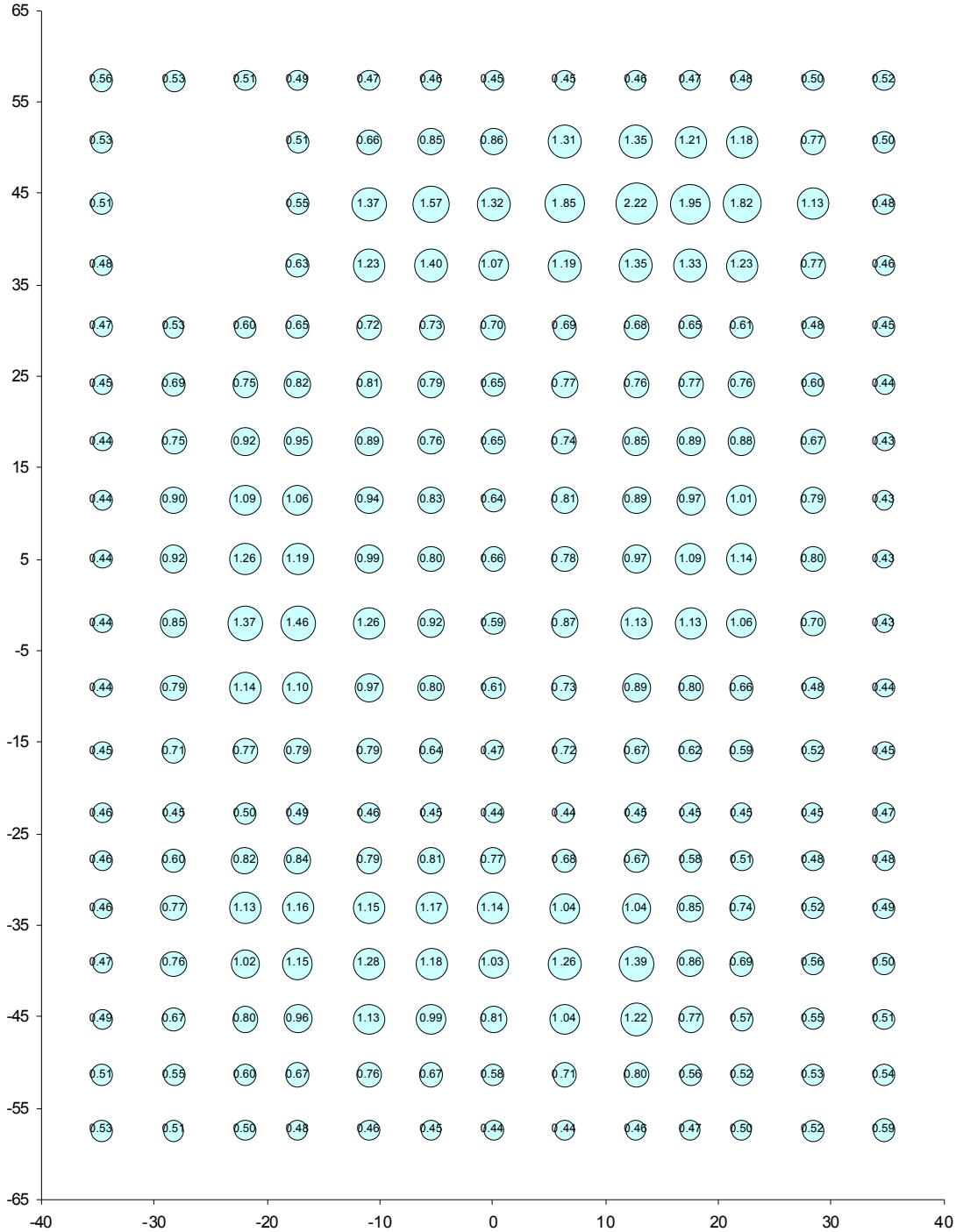

Figure 9 – Roof – Seismic Demand Bubble Plot SRSS Vertical Direction – Elev. 39’-6”

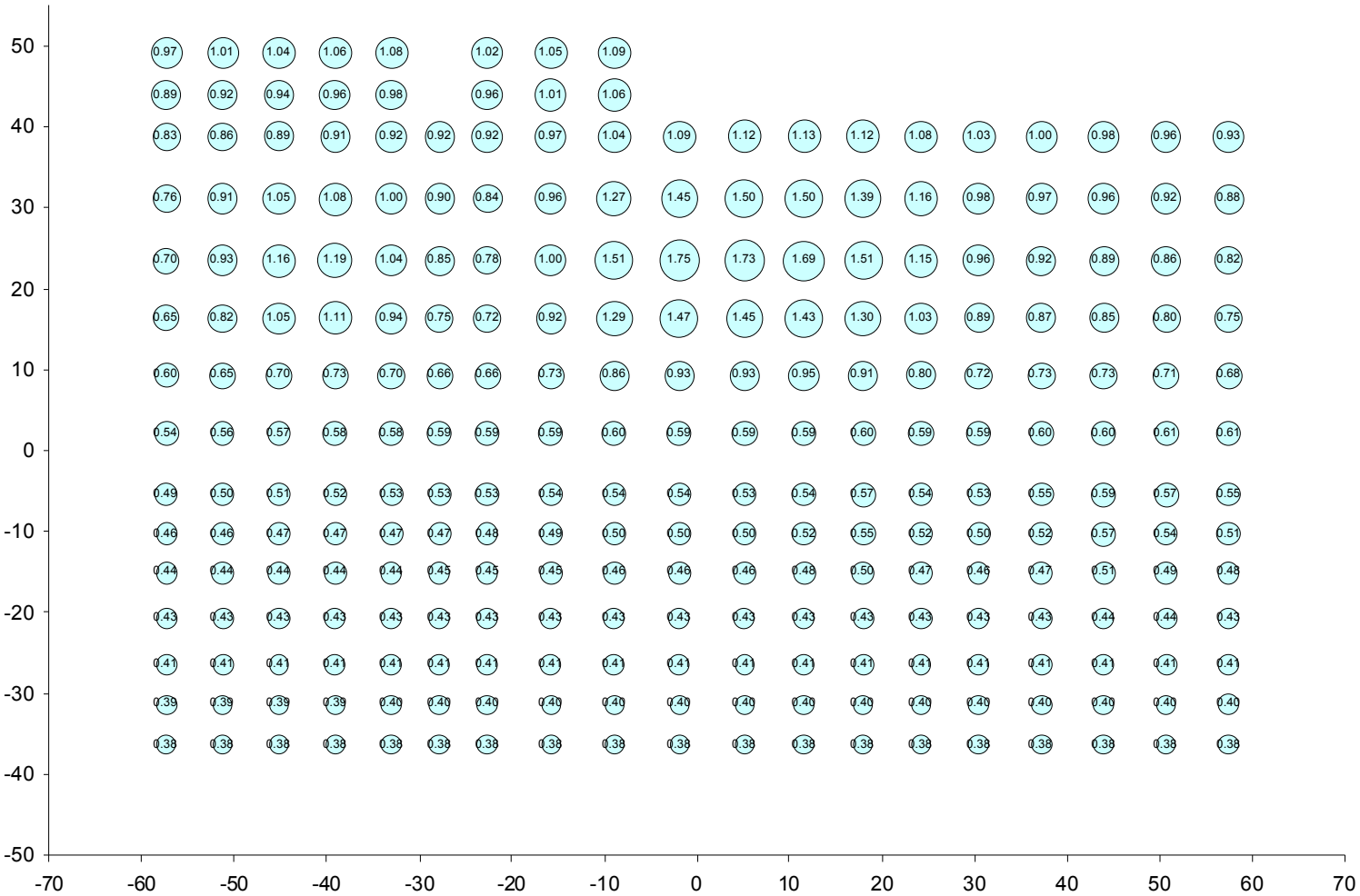

Figure 10 – Wall – Seismic Demand Bubble Plot SRSS A_x, N-S Direction – Column Line AP

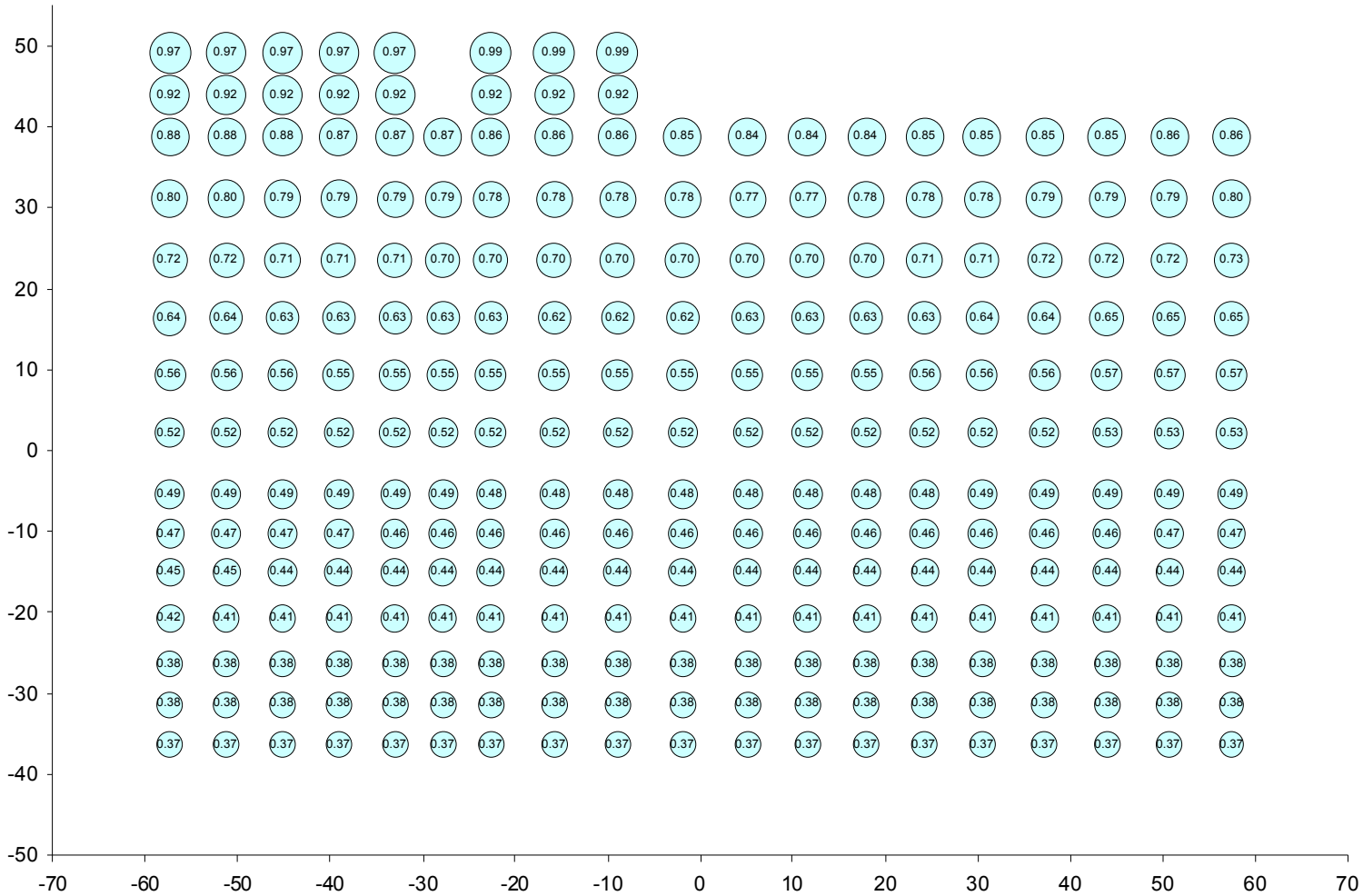

Figure 11 – Wall – Seismic Demand Bubble Plot SRSS A_y, E-W Direction – Column Line AP